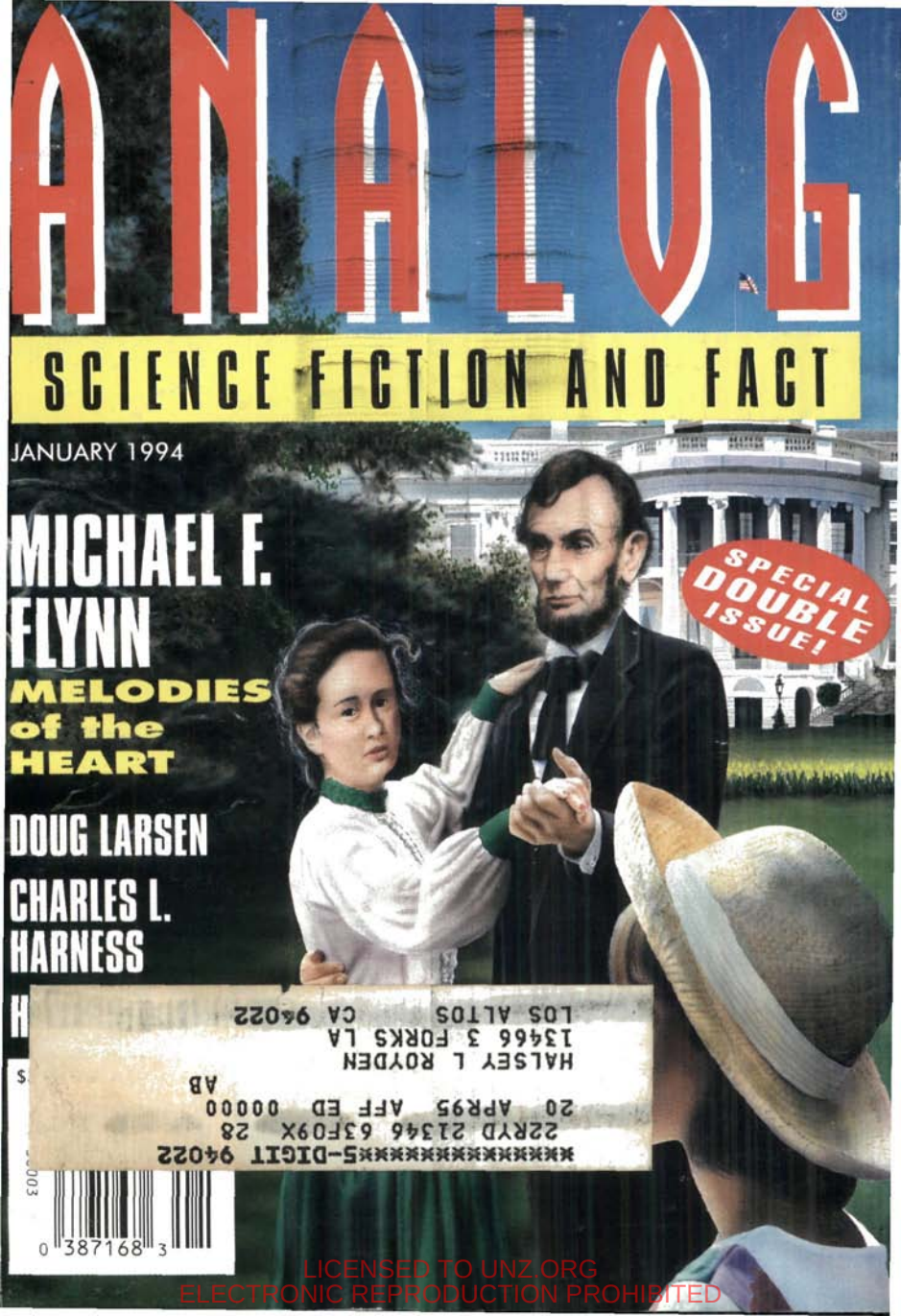

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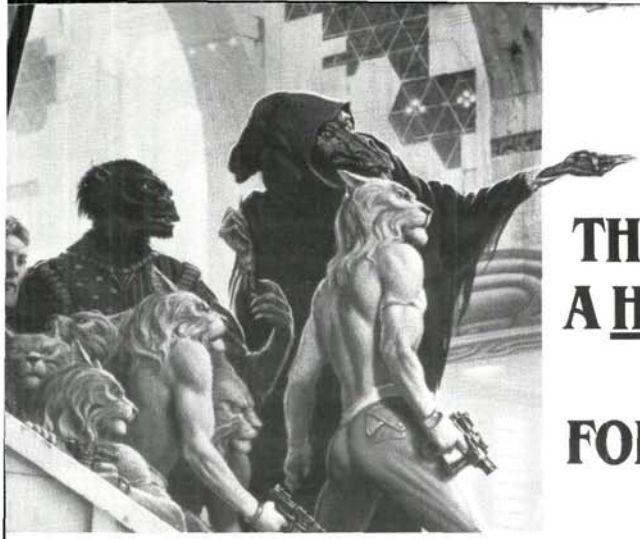

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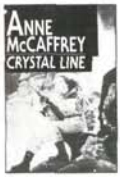

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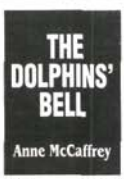

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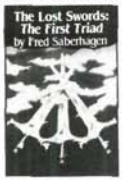

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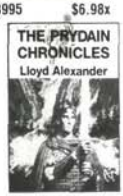

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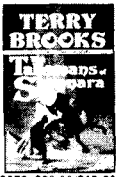

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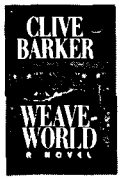

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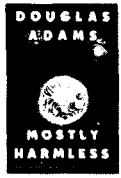

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January 1994

Next Issue on Sale
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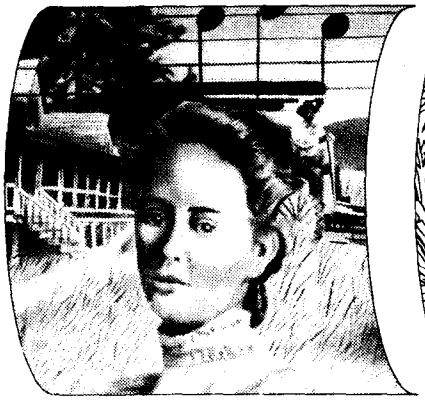
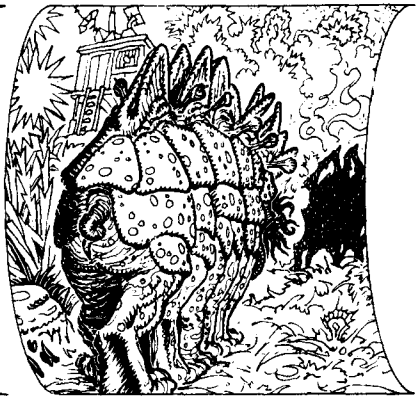
Novellas
MELODIES OF THE HEART, Michael F. Flynn ____ **10**
THE TETRAHEDRON, Charles L. Harness ____ **146**
VIRTUAL PROOF, Doug Larsen ____ **226**

Novelette
UNDER THE WINGS OF OWLS, Hayford Peirce ____ **196**

Science Fact
THE REAL PHYSICS OF TIME TRAVEL, Ian Stewart ____ **106**

Short Stories
EXCERPTS FROM THE DISCUSSION OF THE CONTROLLED VIBRATION THEORY OF COMMUNICATION AMONG THE UN-KIN, Sarah Zettel & Laura Woody ____ **131**
THE LAB ASSISTANT, Erin Leonard ____ **190**





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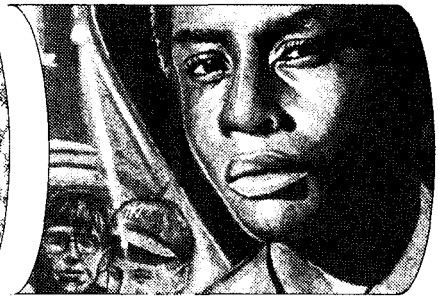

190

Probability Zero
CREATION MYTHS OF THE RECENTLY EXTINCT, Frederik Pohl — **104**

Reader's Departments
THE EDITOR'S PAGE — **4**
THE ALTERNATE VIEW, John G. Cramer — **185**
BIOLOG, Jay Kay Klein — **225**
THE REFERENCE LIBRARY, Tom Easton — **302**
BRASS TACKS — **310**
IN TIMES TO COME — **315**
INDEX — **316**
UPCOMING EVENTS, Anthony Lewis — **320**

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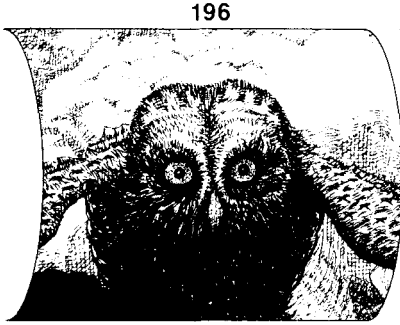
Indicia on page 5

196



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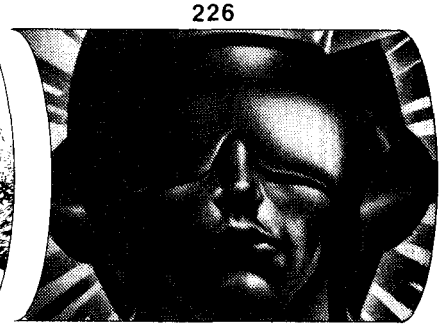

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EDITORIAL Stanley Schmidt

JOB OPENING

WANTED: Entrepreneur with long view, capable of finding a way to make space pay "before its time." Must have sufficient imagination and courage to make large investments now, despite poor prospects for short-term profits and total lack of government support or incentives....

The news is not good. Or is it?

In last April's *Analog*, I called readers' attention to a petition that appeared as part of a public service message elsewhere in the issue, through which they could convey to the federal government their support for the Space Exploration Initiative. I hinted that such support might be exceedingly important because space is important to humanity's future, the window of opportunity might be temporary, and the SEI appeared to be the best option currently available for the U.S.A. to take advantage of that opportunity.

Hardly had the issue hit the stands when my sources in Washington told me that the SEI had been canceled, with no foreseeable hope of revival. Does that mean that the chance for us to expand into space is irrevocably lost? Or might this, like so many other problems, be an opportunity in disguise?

Both Arlan Andrews and Doug Beason, authors of recent *Analog* articles on projected space programs, worked in the White House Science Office under both the Bush and Clinton administrations. As such, they can be presumed to have a better view than most of us of how things work in Washington and in what directions they're likely to move. In his reply to a reader's letter, Arlan sees one possible hope for revival of a federally supported space program: rousingly successful test flights of the DC-X might generate enough interest to prompt funding for a full-scale single-stage-to-orbit project. (See Arlan's article in last June's issue, and G. Harry Stine's in Mid-December.)

But suppose those tests (which, as I write this in June, have been postponed to late July) *don't* go so well, or that even if they do, they fail to stimulate any serious governmental follow-up action. Arlan views that possibility grimly. If an SSTO follow-up has not been funded by the time you read this, he foresees the U.S. space program

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shriveling away to nothing.

Suppose he's right. What's left? If *anybody* is going to do anything with space, and the U.S. government fades out of the picture, that leaves two possibilities: non-U.S., and non-government.

There *is* some evidence of an active interest in space in several other countries; and in the long run, history may not care a great deal who took the first steps into space. In the long run, the important thing is that the human species move out and free itself from its precarious dependence on a single planet. But as individuals, and even as nations, we don't live in the long run. We who live in this country and see the potential out there would like to see *ourselves* play an important role in developing and exploiting that potential. So I'm not going to dwell on scenarios that assume all the interesting stuff will be left for other countries to do.

That brings us down to private enterprise—and that, oddly enough, is where I see a possible opportunity in the present administration's apparent lack of interest in doing anything serious about space.

Many of us would have preferred that all space exploration and development be done by private enterprise all along, but didn't see a way to make it happen. It was too obvious that the start-up costs were too high, and the return on investment too far in the future, to interest private business. As Arlan said in his reply to that letter, "Realistically, without government funding to help, the private sector . . . is not going to risk their money to take us into Space—there's nothing we need to do there now, not yet any way to make a return on investment. Unfortunately, with the technology and finances of the 1990s, only government can begin the process."

Is that really and completely true? Or has it just seemed that way because in the past the obstacles to private space work looked too daunting, and it seemed too likely that government *would* provide a boost to make it easier?

Maybe if government *isn't* going to do that, the best thing it can do is to back out completely, promptly, and unequivocally. As long as the possibility of government help is there, there's relatively little incentive for private individuals or companies to make a really determined effort to do it on their own. If government makes it clear that it *isn't* going to help, then

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the job will *have* to be done privately—or it won't get done at all.

So—will anybody do it? I suggest that the government's retreat from space, if it continues as it seems to have begun, amounts to the job ad at the head of this article. I add my personal challenge: is there, somewhere out there, perhaps among you reading this, some businessman who *does* see the long-range potential for profit in space, and the dangers of waiting, *and* has the imagination and courage to say, "OK, if I don't do it, nobody will; so I'll find a way to do it!"?

Warning: it won't be easy. This is not a job for the faint-hearted, and imagination and courage are not the only requirements. The start-up costs *are* large, and the return on investment slow. A well-qualified applicant will need imagination and courage to find ways to reduce those barriers; but he or she will also need a thorough grounding in the practical skills of running a business, and the nerves and financial resources to wage a long uphill struggle. Arlan is undoubtedly right that the job will not attract businessmen whose primary goal is to make lots of money right away.

But might there be businessmen, perhaps reading this article, whose priorities are a little different? Whose main desire is to make space happen, and who will find ways to make a living on it until it can do more than that? I observed a long time ago that many people tend to fall into two categories in their vocational choices. Some set out primarily to make money, and

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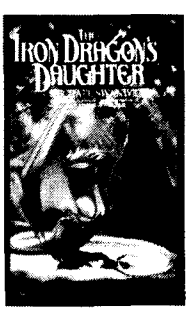

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look for a way to do it; what they wind up doing is a means to an end rather than a passion in itself. Others have such a consuming interest in some field, such as an art or science, that they devote themselves to *doing* it and find a way to make a living at it.

The first type need not apply for this job; space isn't ready for them, and they're not ready for space. If government gets out of the space business, the only people who have a chance of making it happen are the kind whose *first* goal is to do that, and who have the ability to make it pay.

Part of their job, of course, will necessarily involve dealing with governments. Treaties describing extraterrestrial resources as "the common heritage of mankind" sound noble in theory, but in practice pose an enormous obstacle to anything actually being done in space. They will have to be changed. As Jerry Pournelle put it in his Alternate View column for January 1980, "Something that belongs to everyone can belong to no one; and that which no one owns receives very little investment. . . . Who will sow where everyone is allowed to reap?"

In that same column, Jerry acknowledges that some sort of international agreement will be needed, and soon. As I write this, there is talk of renegotiating the Moon Treaty. How, if at all, will that be done? I can only speculate, but any businessman who is determined to make his fortune in space will have to take an active role in shaping any future legislation governing such activities. One good approach might be some sort of "interstellar homesteading" concept, whereby nations and companies can claim extraterrestrial land that they actually use.

This is a far cry from trying to grab, say, half a Moon by simply saying, "I want it, therefore it's mine." It has worked in developing this country's frontiers, and it might well work in developing those beyond this planet. As reader Taras Wolansky commented in a letter to this magazine, "Try to imagine what the last twenty years would have been like if every Moon landing gave the sending country title to a chunk of the Moon. We might have had a 'Moon Rush'!"

Selling that won't be easy, either. Nations without much wherewithal for staking claims will feel threatened by those with a "head start." So any aspiring space developer cannot count on much help in this direction, any more than he can count on government to provide financing for what he believes needs to be done.

But if government makes it clear that it *won't* provide such financing, then it finally becomes clear what such a businessman must do. If he really believes that Americans *must* develop space, and he cannot count on the government to do it, he must find a way to do it himself. Even though it's a daunting job and unlikely to show a profit for a long time, somebody will have to take the plunge—or it won't get plunged.

And a clear signal that government won't foot the bill may provide the best motivation yet for somebody to look harder than ever for ways that private industry *can* do the job on its own. ■

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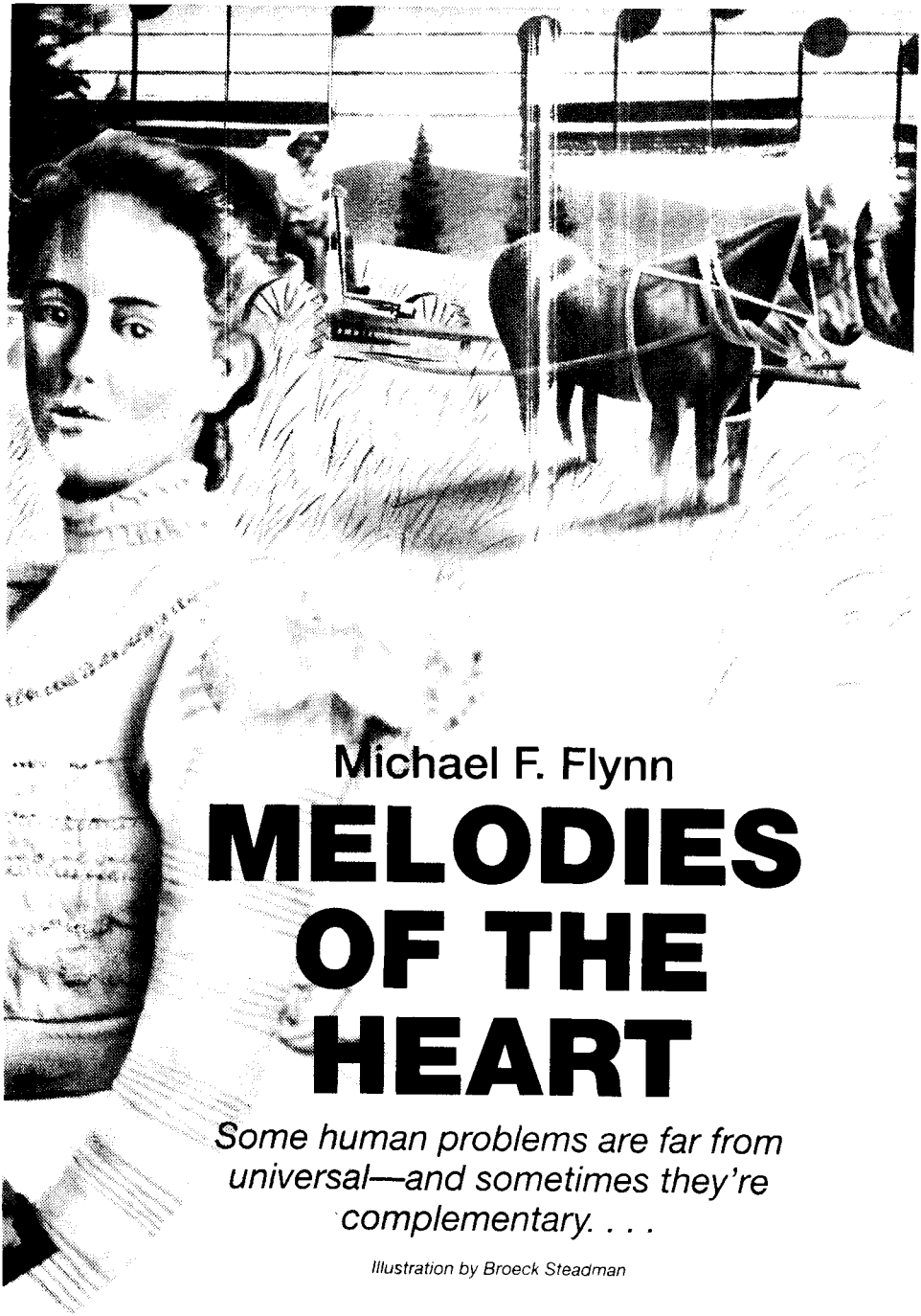

Michael F. Flynn

MELODIES OF THE HEART

Some human problems are far from universal—and sometimes they're complementary. . . .

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I have never been to visit in the gardens of my youth. They are dim and faded memories, brittle with time: A small river town stretched across stony bluffs and hills. Cliffside stairs switchbacking to a downtown of marvels and magical stores. A little frame house nestled in a spot of green, with marigolds tracing its bounds. Men wore hats. Cars gleamed with chrome and sported tailfins enough to take flight. Grown-ups were very tall and mysterious. Sometimes, if you were good, they gave you a nickel, which you could rush to the corner grocery and buy red hot dollars and jawbreakers and licorice whips.

I don't remember the music, though. I know I should, but I don't. I even know what the tunes must have been; I've heard them often enough on Classic Rock and Golden Oldy shows. But that is now, my memories are silent.

I don't go back; I have never gone back. The town would all be different—grimier and dirtier and twenty years more run down. The house I grew up in was sold, and then sold again. Strangers live there now. The cliffside stairs have fallen into disrepair, and half the stores are boarded up and silent. The corner groceries are gone, and a nickel won't buy you squat. Grown-ups are not so tall.

They are still a mystery, though. Some things never change.

The music is dreamy.
It's peaches and creamy.
Oh! don't let my feet touch the ground. . . .

* * *

I remember her as I always remember her: sitting against the wall in the garden sunshine, eyes closed, humming to herself.

The first time I saw Mae Holloway was my first day at Sunny Dale. On a tour of the grounds, before being shown to my office, the director pointed out a shrunken and bent old woman shrouded in a shapeless, pale-hued gown. "Our Oldest Resident." I smiled and acted as if I cared. What was she to me? Nothing, then.

The resident doctor program was new then. A conservative looking for a penny to pinch and a liberal looking for a middle-class professional to kick had gotten drunk together one night and come up with the notion that, if you misunderstood the tax code, your professional services could be extorted by the state. My sentence was to provide on-site medical care at the Home three days a week. Dr. Khan, who kept an office five miles away, remained the "primary care provider."

The Home had set aside a little room that I could use for a clinic. I had a metal desk, an old battered filing cabinet, a chair with a bad caster that caused the wheel to seize up—as if there were a Rule that the furniture there be as old and as worn as the inhabitants. For supplies, I had the usual medicines for aches and pains. Some digitalis. Ointments of one sort or another. Splints and bandages. Not much else. The residents were not ill, only old and tired. First aid and mortuaries covered most of their medical needs.

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The second time I saw Mae Holloway was later that same day. The knock on the door was so light and tentative that at first I was unsure I had heard it. I paused, glanced at the door, then bent again over my medical journal. A moment later, the knock came again. Loud! As if someone had attacked the door with a hammer. I turned the journal down, open to the page I had been reading, and called out an invitation.

The door opened and I waited patiently while she shuffled across the room. Hobble, hobble, hobble. You would think old folks would move faster. It wasn't as though they had a lot of time to waste.

When she had settled into the hard plastic seat opposite my desk, she leaned forward, cupping both her hands over the knob of an old blackthorn walking stick. Her face was as wrinkled as that East Tennessee hill country she had once called home. "You know," she said—loudly, as the slightly deaf often do, "you oughtn't leave your door shut like that. Folks see it, they think you have someone in here, so they jes' mosey on."

That notion had been in the back of my mind, too. I had thought to use this time to keep up with my professional reading. "What may I do for you, Mrs. Holloway?" I said.

She looked away momentarily. "I think—" Her jaw worked. She took a breath. "I think I am going insane."

I stared at her for a moment. Just my luck. A nut case right off the bat. Then I nodded. "I see. And why do you say that?"

"I hear music. In my head."

"Music?"

"Yes. You know. Like this." And she hummed a few bars of a nondescript tune.

"I see—"

"That was 'One O'Clock Jump!' " she said, nearly shouting now. "I used to listen to Benny Goodman's band on 'Let's Dance!' Of course, I was younger then!"

"I'm sure you were."

"WHAT DID YOU SAY?"

"I SAID, 'I'M SURE YOU WERE'!" I shouted at her across the desk.

"Oh. Yes," she said in a slightly softer voice. "I'm sorry, but it's sometimes hard for me to hear over the music. It grows loud, then soft." The old woman puckered her face and her eyes drifted, becoming distanced. "Right now, it's 'King Porter.' A few minutes ago it was—"

"Yes, I'm sure," I said. Old folks are slow and rambling and forgetful; a trial to talk with. I rose, hooking my stethoscope into my ears, and circled the desk. Might as well get it over with. Mrs. Holloway, recognizing the routine, unfastened the top buttons of her gown.

Old folks have a certain smell to them, like babies; only not so pleasant. It is a sour, dusty smell, like an attic in the summer heat. Their skin is dry, spotted parchment, repulsive to the touch. When I placed the diaphragm against her chest, she smiled nervously. "I don't think you'll hear my music that way," she said.

"Of course not," I told her. "Did you think I would?"

She rapped the floor with her walking stick. Once, very sharp. "I'm no

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child, Doctor Wilkes! I have not been a child for a long, long time; so, don't treat me like one." She waved her hand up and down her body. "How many children do you know who look like me?"

"Just one," I snapped back. And instantly regretted the remark. There was no point in being rude; and it was none of her business anyway. "Tell me about your music," I said, unhooking my stethoscope and stepping away.

She worked her lips and glared at me for a while before she made up her mind to cooperate. Finally, she looked down at the floor. "It was one, two nights ago," she whispered. Her hands gripped her walking stick so tightly that the knuckles stood out large and white. She twisted it as if screwing it into the floor. "I dreamed I was dancing in the Roseland Ballroom, like I used to do years and years ago. Oh, I was once so light on my feet! I was dancing with Ben Wickham—he's dead now, of course; but he was one smooth apple and sure knew how to pitch woo. The band was a swing band—I was a swinger, did you know?—and they were playing Goodman tunes. 'Sing, Sing, Sing.' 'Stardust.' But it was so loud, I woke up. I thought I was still dreaming for a while, because I could still hear the music. Then I got riled. I thought, who could be playing their radio so loud in the middle of the night? So I took myself down the hall, room by room, and listened at each door. But the music stayed the same, no matter where I went. That's when I knowed . . ." She paused, swallowed hard, looked into the corner. "That's when I knowed, knew, it was all in my head."

I opened the sphygmomanometer on my desk. Mae Holloway was over a hundred years old, according to the Home's director; well past her time to shuffle off. If her mind was playing tricks on her in her last years, well, that's what old minds did. Yet, I had read of similar cases of "head" music. "There are several possibilities, Mrs. Holloway," I said, speaking loudly and distinctly while I fastened the pressure cuff to her arm, "But the best bet is that the music really *is* all in your head."

I smiled at the *bon mot*, but all the wire went out of her and she sagged shapelessly in her chair. Her right hand went to her forehead and squeezed. Her eyes twisted tight shut. "Oh, no," she muttered. "Oh, dear God, no. It's finally happened."

Mossbacks have no sense of humor. "Please, Mrs. Holloway! I didn't mean 'in your head' like that. I meant the fillings in your teeth. A pun. Fillings sometimes act like crystal radios and pick up broadcast signals, vibrating the small bones of the middle ear. You are most likely picking up a local radio station. Perhaps a dentist could—"

She looked up at me and her eyes burned. "That was a wicked joke to pull, boy. It was cruel."

"I didn't mean it that way—"

"And I know all about fillings and radios and such," she snapped. "Will Hickey had that problem here five years ago. But that can't be why I hear music." And she extruded a ghastly

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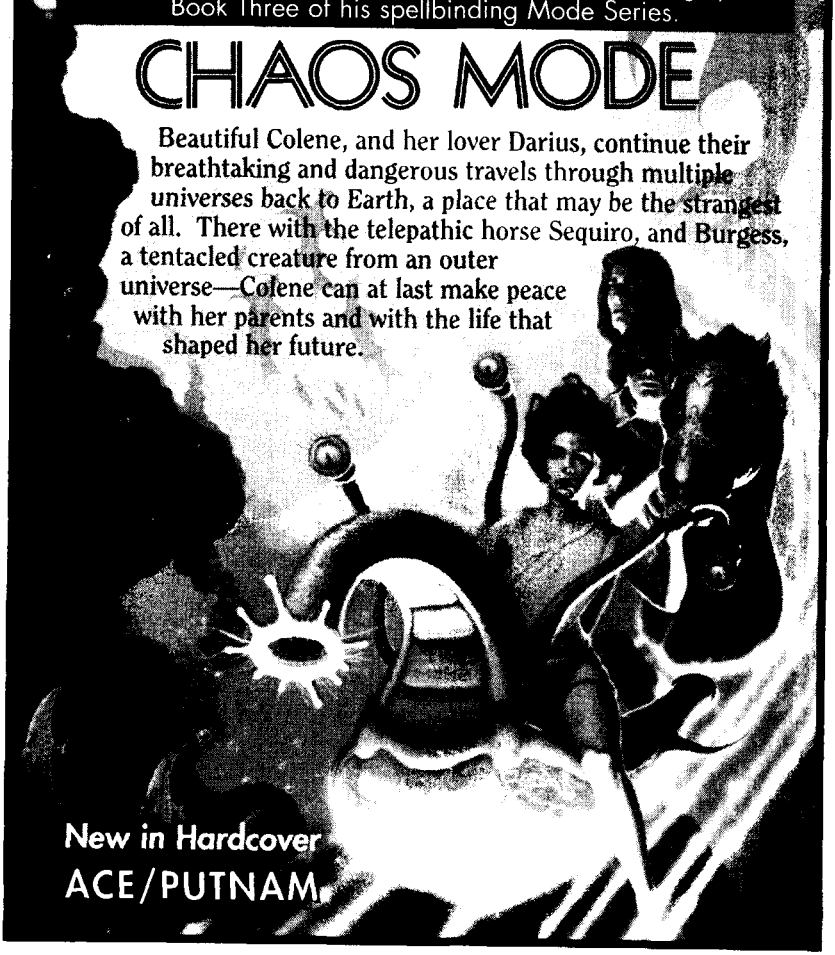

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set of false teeth.

"Well, then—"

"And what sort of radio station could it be? Swing tunes all the time, and only those that I know? Over and over, all night long, with no interruptions. No commercials. No announcements of song titles or performers." She raised her free hand to block her ear, a futile gesture, because the music was on the other side.

On the other side of the ear...? I recalled certain case studies from medical school. Odd cases. "There are other possibilities," I said. "Neurological problems...." I pumped the bulb and she winced as the cuff tightened. She lowered her hand slowly and looked at me.

"Neuro...?" Her voice trembled.

"Fossil memories," I said.

She shook her head. "I ain't—I'm not rememberin'. I'm hearin'. I know the difference."

I let the air out of the cuff and unfastened it. "I will explain as simply as I can. Hearing occurs in the brain, not the ear. Sound waves vibrate certain bones in your middle ear. These vibrations are converted into neural impulses and conveyed to the auditory cortex by the eighth cranial nerve. It is the auditory cortex that creates 'sound.' If the nerve were connected to the brain's olfactory region instead, you would 'smell' music."

She grunted. "Quite a bit of it smells, these days."

Hah, hah. "The point is that the sensory cortices can be stimulated without external input. Severe migraines, for example, often cause people to 'see' visions or 'hear' voices. And sometimes the stimulus reactivates so-called 'fossil' memories, which your mind interprets as contemporary. That may be what you are experiencing."

She looked a little to the side, not saying anything. I listened to her wheezy breath. Then she gave me a glance, quick, almost shy. "Then, you don't think I'm... you know... crazy?" Have you ever heard hope and fear fused into a single question? I don't know. At her age, I think I might prefer a pleasant fantasy world over the dingy real one.

"It's unlikely," I told her. "Such people usually hear voices, not music. If you were going insane, you wouldn't hear Benny Goodman tunes; you would hear Benny Goodman—probably giving you important instructions."

A smile twitched her lips and she seemed calmer, though still uneasy. "It's always been a bother to me," she said quietly, looking past me, "the notion that I might be—well, you know. All my life, it seems, as far back as I can remember."

Which was not that far, the director had told me that morning. "All your life. Why is that?"

She looked away and did not speak for a moment. When she did, she said, "I haven't had no, any, headaches, doc. And I don't have any now. If that's what did it, how come I can still hear the music?"

If she did not want to talk about her fears, that was fine with me. I was no psychiatrist, anyway. "I can't be sure without further tests, but a trig-

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ger event—possibly even a mild stroke—could have initiated the process." I had been carefully observing her motor functions, but I could detect none of the slackness or slurring of the voice typical of severe hemiplegia. "Dr. Wing is the resident neurologist at the hospital," I said. "I'll consult with him."

She looked suddenly alarmed, and shook her head. "No hospitals," she said firmly. "Folks go to hospitals, they die."

At her age, that was largely true. I sighed. "Perhaps at Khan's clinic, then. There really are some tests we should run."

That seemed to calm her somewhat, for she closed her eyes and her lips moved slightly.

"Have you experienced any loss of appetite, or episodes of drowsiness?" I asked. "Have you become irritable, forgetful, less alert?" Useless questions. What geezer did not have those symptoms? I would have to inquire among the staff to find out if there had been a recent change in her behavior.

And she wasn't listening any more. At least, not to me. "Thank you, Doctor Wilkes. I was so afraid.... That music.... But only a stroke, only a stroke. It's such a relief. Thank you. Such a relief."

A relief? Compared to madness, I suppose it was. She struggled to her feet, still babbling. When she left my office, hobbling once more over her walking stick, she was humming to herself again. I didn't know the tune.

Even though we're drifting down
life's stream apart
Your face I still can see in dream's domain;
I know that it would ease my breaking heart
To hold you in my arms just once again.

It was dark when I arrived home. As I turned into the driveway I hit the dashboard remote, and the garage door rose up like a welcoming lover. I slid into the left-hand slot without slowing, easing the Lincoln to a halt just as the tennis ball, hanging by a string from the ceiling, touched the windshield. Brenda never understood that. Brenda always came to a complete stop in the driveway before raising the garage door.

I could see without looking that I had beaten her home again. And they said doctors kept long hours.... When I stepped from the car, I turned my back on the empty slot.

I stood for some moments at the door to the kitchen, jiggling the car keys in my hand. Then, instead of entering the house, I turned and left the garage through the backyard door. I had seen the second story light on as I came down the street. Deirdre's room. Tonight, for some reason, I couldn't face going inside just yet.

The back yard was a gloom of emerald and jade. The house blocked the glare of the street lamps, conceding just enough light to tease shape from shadow. I walked slowly through the damp grass toward the back of the lot. Glowing clouds undulated in the water of the swimming pool, as if the ground had opened up and swallowed the night sky. Only a few stars

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poked through the overcast. Polaris? Sirius? I had no way of knowing. I doubted that half a dozen people in the township knew the stars by name; or perhaps even that they had names. We have become strangers to our skies.

At the back of the lot, the property met a patch of woodland—a bit of unofficial greenbelt, undeveloped because it was inaccessible from the road. Squirrels lived there, and blue jays and cardinals. And possum and skunk, too. I listened to the rustle of the night dwellers passing through the carpet of dead leaves. Through the trees I could make out the lights of the house opposite. Distant music and muffled voices. Henry and Barbara Carter were throwing a party.

That damned old woman. Damn all of them. Shambling, crackling, brittle, dried-out old husks, clinging fingernail-tight to what was left of life. . . .

I jammed my hands in my pockets and stood there. For how long, I do not know. It might have been five minutes or half an hour. Finally the light on the second floor went out. Then I turned back to the house and reentered through the garage. The right-hand stall was still empty.

Consuela sat at the kitchen table near the French doors, cradling a ceramic mug shaped like an Olmec head. Half the live-in nurses in the country are Latin; and half of those are named Consuela. The odor of cocoa filled the room, and the steam from the cup wreathed her broad, flat face, lending it a sheen. More *Indio* than *Ladino*, her complexion contrasted starkly with her nurse's whites. Her jet-black hair was pulled severely back, and was held in place with a plain, wooden pin.

"Good evening, Nurse," I said. "Is Dee-dee down for the night?"

"Yes, Doctor. She is."

I glanced up at the ceiling. "I usually tuck her in."

She gave me an odd look. "Yes, you do."

"Well. I was running a little late today. Did she miss me?"

Consuela looked through the French doors at the back yard. "She did."

"I'll make it up to her tomorrow."

She nodded. "I'm sure she would like that."

I shed my coat and carried it to the hall closet. A dim night light glowed at the top of the stairwell. "Has Mrs. Wilkes called?"

"An hour ago." Consuela's voice drifted down the hallway from the kitchen. "She has a big case to prepare for tomorrow. She will be late."

I hung the coat on the closet rack and stood quietly still for a moment before closing the door. Another big case. I studied the stairs to the upper floor. Brenda had begun getting the big cases when Deirdre was eighteen months and alopecia had set in. Brenda never tucked Dee-dee into bed after that.

Consuela was washing her cup at the sink when I returned to the kitchen. She was short and dark and stocky. Not quite chubby, but with a roundness that scorned New York and Paris fashion. I rummaged in the freezer for a frozen dinner. Brenda

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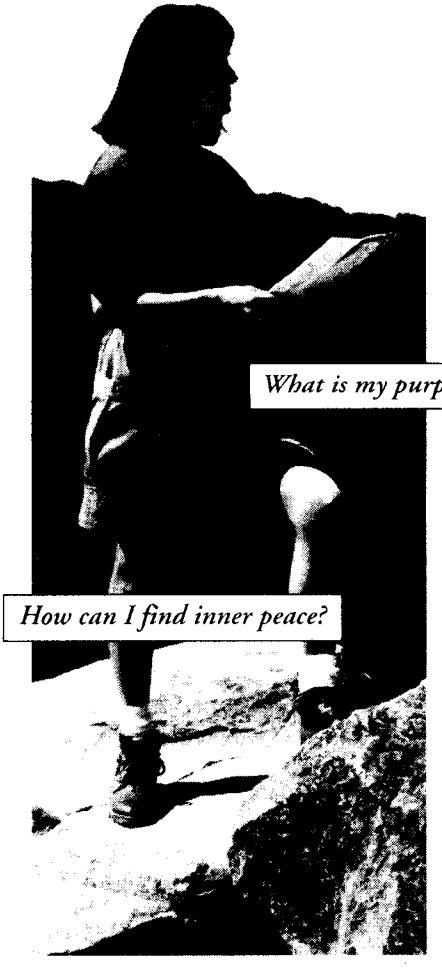

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had picked Consuela from among a dozen applicants. Brenda was tall and thin and blonde.

I put the dinner in the microwave and started the radiation. "I met an interesting woman today," I said.

Consuela dried her cup and hung it on the rack. "All women are interesting," she said.

"This one hears music in her head." I saw how that piqued her interest.

"We all do," she said, half-turned to go.

I carried my microwaved meal and sat at the table. "Not like this. Not like hearing a radio at top volume."

She hesitated a moment longer; then she shrugged and sat across the table from me. "Tell me of this woman."

I moved the macaroni and cheese around on my plate. "I spoke with Dr. Wing over the car phone. He believes it may be a case of 'incontinent nostalgia,' or Jackson's Syndrome."

I explained how trauma to the temporal lobe sometimes caused spontaneous upwellings of memory, often accompanied by "dreamy states" and feelings of profound and poignant joy. Oliver Sacks had written about it in one of his best-sellers. "Shostakovitch had a splinter in his left temporal lobe," I said. "When he cocked his head, he heard melodies. And there have been other cases. Stephen Foster, perhaps." I took a bite of my meal. "Odd, isn't it, how often the memories are musical."

Consuela nodded. "Sometimes the music is enough."

"Other memories may follow, though."

"Sometimes the music is enough," she repeated enigmatically.

"It should make the old lady happy, at least."

Consuela gave me a curious look. "Why should it make her happy?" she asked.

"She has forgotten her early years completely. This condition may help her remember." An old lady reliving her childhood. Suddenly there was bitterness in my mouth. I dropped my fork into the serving tray.

Consuela shook her head. "Why should it make her happy?" she asked again.

That little bird knew lots of things.
It did, upon my word. . . .

The Universe balances. For every Consuela Montejo there is a Noor Khan.

Dr. Noor Khan was a crane, all bones and joints. She was tall, almost as tall as I, but thin to the point of gauntness. She cocked her head habitually from side to side. That, the bulging eyes, and the hooked nose accentuated her bird-like appearance. A good run, a flapping of the arms, and she might take squawking flight—and perhaps appear more graceful.

"Mae Holloway. Oh, my, yes. She is a feisty one, is she not?" Khan rooted in her filing cabinet, her head bobbing as she talked. "Does she have a problem?"

"Incontinent nostalgia, it's sometimes called," I said. "She is experiencing spontaneous, musical recollections, possibly triggered by a mild

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stroke to the temporal lobes." I told her about the music and Wing's theories.

She bobbed her head. "Curious. Like *déjà vu* only different." Then, more sternly. "If she has had a stroke, even a mild one, I must see her at once."

"I've told her that, but she's stubborn. I thought since you knew her better. . . ."

Noor Khan sighed. "Yes. Well, the older we grow, the more set in our ways we become. Mae must be set in concrete."

It was a joke and I gave it a thin smile. *The older we grow. . . .*

The file she finally pulled was a thick one. I took the folder from her and carried it to her desk. I had nothing particular in mind, just a review of Holloway's medical history. I began paging through the records. In addition to Dr. Khan's notes, there were copies of records from other doctors. I looked up at Khan. "Don't you have patients waiting?"

She raised an eyebrow. "My office hours start at ten, so I have no patients at the moment. You need not worry that I am neglecting them."

If it was a reproof, it was a mild one, and couched in face-saving Oriental terms. I hate it when people watch me read. I always feel as if they were reading over my shoulder. I wanted to tell Khan that I would call her if I needed her; but it was, after all, her office and I was sitting at her desk, so I don't know what I expected her to do. "Sorry," I said. "I didn't mean to ruffle your feathers."

* * *

Holloway was in unusually good health for a woman of her age. Her bones had grown brittle and her eyes nearsighted—but no glaucoma; and very little osteoporosis. She had gotten a hearing aid at an age when most people were already either stone deaf or stone dead. Clinical evidence showed that she had once given birth, and that an anciently broken leg had not healed entirely straight. What right had she to enjoy such good health?

Khan had been on the phone. "Mae has agreed to come in," she told me as she hung up. "I will send the van to pick her up Tuesday. I wish I could do a CAT scan here. I would hate to force her in hospital."

"It's a waste, anyway," I muttered.

"What?"

I clamped my jaw shut. All that high technology, and for what? To add a few miserable months to lives already years too long? How many dollars per day of life was that? How much of it was productively returned? That governor, years ago. What was his name? Lamm? He said that the old had a duty to die and make room for the young. "Nothing," I said.

"What is wrong?" asked Khan.

"There's nothing wrong with me."

"That wasn't what I asked."

I turned my attention to the folder and squinted at the spidery, illegible handwriting on the oldest record: 1962, if the date was really what it looked like. Why did so many doctors have poor handwriting? Holloway's estimated age looked more like an eighty-five than sixty-five. I waved the

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sheet of stationery at her. "Look at the handwriting on this," I complained. "It's like reading Sanskrit."

Khan took the letter. "I can read Sanskrit, a little," she said with a smile. "It's Doctor Bench's memoir, isn't it? Yes, I thought so. I found it when I assumed Dr. Rosenblum's practice a few years ago. Dr. Bench promised he would send Mrs. Holloway's older records, but he never did, so Howard had to start a medical history almost from scratch, with only this capsule summary."

I took the sheet back from her. "Why didn't Bench follow through?"

She shrugged. "Who knows? He put it off. Then one of those California brush fires destroyed his office. Medically, Mae is a blank before 1962."

Just like her mind. I thought. Just like her mind.

For the joy of eye and ear
For the heart and mind's delight
For the mystic harmony
Linking sense to sound and sight....

The third time I saw Mae Holloway, she was waiting by the clinic door when I arrived to open it. Eyes closed, propped against the wall by her walking stick, she hummed an obscure melody. "Good morning, Mrs. Holloway," I said. "Feeling better today?"

She opened her eyes and squeezed her face into a ghastly pucker. "Consarn music kept me awake again last night."

I gave her a pleasant smile. "Too bad you don't hear Easy Listening." I stepped through the door ahead of her. I heard her cane tap-tap-tapping behind me and wondered if a practiced ear could identify an oldster by her distinctive cane tap. I could imagine Tonto, ear pressed to the ground. "Many geezer come this way, *kemo sabe*."

Snapping open my briefcase, I extracted my journals and stacked them on the desk. Mae lowered herself into the visitor's chair. "Jimmy Kovacs will be coming in to see you later today. He threw his back out again."

I opened the issue of *Brain* that Dr. Wing had lent me. "Never throw anything out that you might need again later," I said, running my eye down the table of contents.

"You do study on those books, Doctor."

"I like to keep up on things."

I flipped the journal open to the article I had been seeking and began to read. After a few minutes, she spoke again. "If you spent half the time studying on people as you do studying on books, you'd be better at doctorin'."

I looked up scowling. Who was she to judge? A bent-up, shriveled old woman who had seen more years than she had a right to. "The body is an intricate machine," I told her. "The more thoroughly I understand its mechanisms, the better able I am to repair it."

"A machine," she repeated.

"Like an automobile."

"And you're jest an auto mechanic." She shook her head.

I smiled, but without humor. "Yes, I am. Maybe that's less glamorous than being a godlike healer, but I

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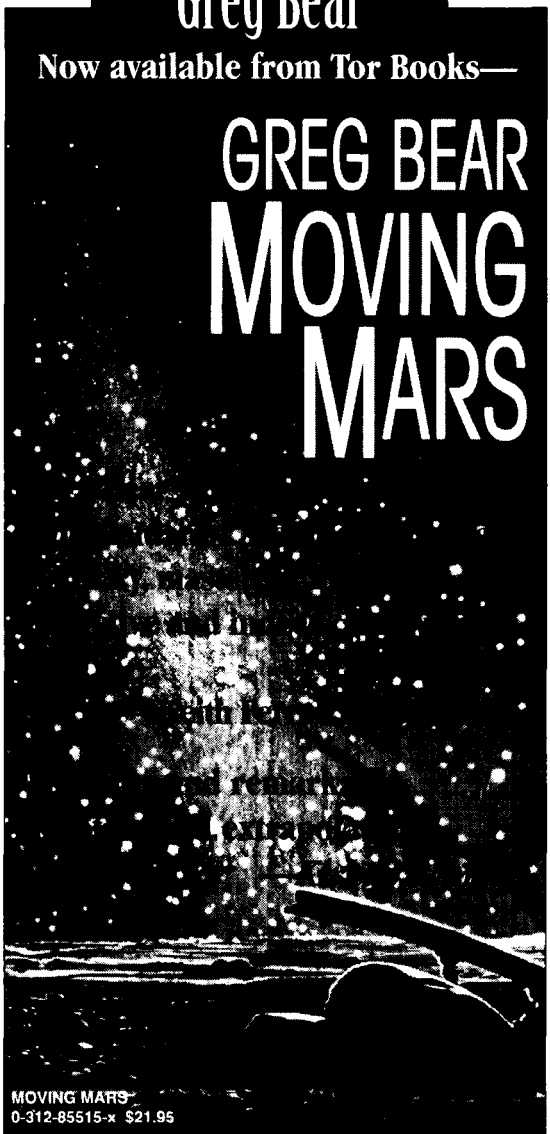

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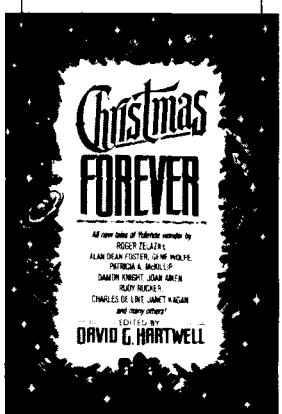

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think it's closer to the truth." An auto mechanic. And some cars were old jalopies destined for the junk heap; so why put more work into them? I did not tell her that. And others were not built right to begin with. I did not tell her that, either. It was a cold vision, but in its way, comforting. Helplessness is greater solace than failure.

Mae grunted. "Mostly milk sours 'cause it's old."

I scowled again. More hillbilly philosophy? Or simply an addled mind unable to hold to a topic? "Does it," I said.

She studied me for a long while without speaking. Finally, she shook her head. "Most car accidents are caused by the driver."

"I'll pass that along to the National Transportation Safety Board."

"What I mean is, you might pay as much attention to the driver as to the automobile."

I sighed and laid the journal aside. "I take it that you want to tell me what is playing on your personal Top 40 today."

She snorted, but I could see that she really did. I leaned back in my chair and linked my hands behind my head. "So, tell me, Mrs. Holloway, what is 'shaking'?"

She made fish faces with her lips. Mentally, I had dubbed her Granny Guppy when she did that. It was as if she had to flex her lips first to ready them for the arduous task of flapping.

"'Does Your Mother Know You're Out, Cecelia?'"

"What?" It took a moment. Then I realized that it must have been a song title. Some popular ditty now thankfully forgotten by everyone save this one old lady. "Was that a favorite song of yours?" I asked.

She shook her head. "Oh, mercy, no; but there was a year when you couldn't hardly avoid it."

"I see."

"And, let's see...." She stopped and cocked her head. The Listening Look, I called it. "Now it's 'The Red, Red Robin'—"

"Comes bob-bob-bobbing along?"

"Yes, that's the one. And already today I've heard 'Don't Bring Lulu' and 'Side by Side' and 'Kitten on the Keys' and 'Bye-bye Blackbird'." She made a pout with her lips. "I do wish the songs would play out entirely."

"You told me they weren't your favorite songs."

"Some are, some aren't. They're just songs I once heard. Sometimes they remind me of things. Sometimes it seems as if they *almost* remind me of things. Things long forgotten, but waiting for me, just around a corner somewhere." She shook herself suddenly. "Tin Pan Alley wasn't my favorite, though," she went on. "I was a sheba. I went for the wild stuff. The Charleston; the Black Bottom. All those side kicks.... I was a little old for that, but.... Those were wild days, I tell you. Hip flasks and stockings rolled down and toss away the corset." She gave me a wink.

This...*prune* had gone for the wild stuff? Though, grant her, she had had her youth once. It didn't seem fair that she should have it twice. "Sheba?" I asked.

"A sheba," she said. "A flapper. The men were sheiks. Because of that

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. . . what was his name?" She tapped her cane staccato on the floor. "Valentino, that was it. Valentino. Oh, those eyes of his! All the younger girls dreamed about having him; and I wouldn't have minded one bit, myself. He had It."

"It?"

"It. Valentino drove the girls wild, he did. And a few boys, too. Clara Bow had It, too."

"Sex appeal?"

"Pshaw. Sex appeal is for snugglepups. A gal didn't have It unless both sexes felt something. Women, too. Women were coming out back then. We could smoke, pet, put a bun on if we wanted to—least, 'til the dries put on the kabosh. We had the vote. Why we even had a governor, back in Wyoming, where I once lived. Nellie Taylor Ross. I met her once, did I tell you? Why I remember—"

Her sudden silence piqued me. "You remember what?"

"Doc?" Her voice quavered and her eyes looked right past me, wide as tunnels.

"What is it?"

"Doc? I can see 'em. Plain as day."

"See whom, Mrs. Holloway?" Was the old biddy having a seizure right there in my office?

She looked to her left, then her right. "We're sitting in the gallery," she announced. "All of us wearing pants, too, 'stead o' dresses. And down there . . . down there . . . " She aimed a shaking finger at a point somewhere below my desk. "That's Alice with the gavel. Law's sake! They're ghosts, Doc. They're ghosts all around me!"

"Mrs. Holloway," I said. "Mrs. Holloway, close your eyes."

She turned to me. "What?"

"Close your eyes."

She did. "I can still see 'em," she said, with a wonder that was close to terror. "I can still see 'em. Like my eyes were still open." She raised a shaking hand to her mouth. Her ragged breath slowly calmed and, more quietly, she repeated, "I can still see 'em." A heartbeat went by, then she sighed. "They're fading, now," she said. "Fading." Finally, she opened her eyes. She looked troubled. "Doc, what happened to me? Was it a hallucy-nation?"

I leaned back in my chair and folded my hands under my chin. "Not quite. Simply a non-musical memory."

"But . . . it was so *real*, like I done traveled back in time."

"You were here the whole time," I assured her with a grin.

She struck the floor with her cane. "I know that. I could see you just as plain as I could see Alice and the others."

I sighed. Her sense of humor had dried out along with the rest of her. "Patients with your condition sometimes fall into 'dreamy states'," I explained. "They see or hear their present and their remembered surroundings simultaneously, like a film that has been double-exposed. Hughlings Jackson described the symptom in 1880. He called it a 'doubling of consciousness.' " I smiled and tapped the journal Wing had given me. "Comes from studying on books," I

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said.

But she wasn't paying me attention. "I remember it all so clearly now. I'd forgotten. Alice Robertson of Oklahoma was the first woman to preside over the House of Representatives. June 20, 1921, it was. Temporary Speaker. Oh, those were a fine fifteen minutes, I tell you." She sighed and shook her head. "I wonder," she said. "I wonder if I might remember my Ma and Pa and my little brother. Zach...? Was that his name? It's always been a trouble to me that I've forgotten. It don't seem right to forget your own kin."

An inverse square law, I suppose. Memories dim and blur with age, their strength depending on distance and mass. Too many of Mae's memories were too distant. They had passed beyond the horizon of her mind, and had faded like an old photograph left too long in the Sun. And yet sometimes, near the end, like ashes collapsing in a dying fire, the past can become brighter than the present.

"No," I said. "It don't seem right."

"And Mister.... Haven't thought on that man in donkey's years," she said. "Green Holloway was my man. I always called him Mister. He called me his Lorena."

"Lorena?"

Mae shrugged. "I don't remember why. There was a song.... He took the name from that. It was real popular, so I suppose I'll recollect it bye and bye. He was an older man, was Mister. I remember him striding up through Black's hell; gray and grizzled, but strong as splo. All brass and buckles in his state militia uniform. Company H, 5th Tennessee. Just that one scene has stayed with me all my life, like an ole brown photograph. Dear Lord, but that man had arms like cooper's bands. I can close my eyes and feel them around me sometimes, even today." She shivered and looked down.

"Splo?" I prompted.

"Splo," she repeated in a distracted voice. Then, more strongly, as if shoving some memory aside, "Angel teat. We called it apple john back then. Mister kept a still out behind the joe. Whenever he run off a batch, he'd invite the spear-side over and we'd all get screwed."

I bet. Whatever she had said. "Apple john was moonshine?" *High tail it, Luke. The revenooers are a-coming.* What kind of Barney Google life had she led up in those Tennessee hills? "So when you say you got screwed, you mean you got drunk, not, uh...."

Mae sucked in her lips and gnawed on them. "It was good whilst we were together," she said at last. "Right good." Her lips thinned. "But Mister, he lit a shuck on me, just like all the others." She gave me a look, half angry, half wary; and I could almost see the shutter come down behind her eyes. "Ain't no use getting close to nobody," she said. "They're always gone when you need them. Why, I ain't, haven't seen Little Zach nigh unto...." She looked momentarily confused. "Not for years and years. I loved that boy like he was more'n a brother; but he yondered off and never come back." She creaked to her

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feet. "So, I'll just twenty-three skidoo, Jack. You got things to do; so do I."

I watched her go, thinking she was right about one thing. Old milk does go sour.

There will I find a settled rest
While others go and come.
No more a stranger or a guest
But like a child at home.

Brenda's silver Beemer was parked in the garage when I got home. I pulled up beside it and contemplated its shiny perfection as I turned my engine off. Brenda was home. How long had it been, now? Three weeks? Four? It was hard to remember. Leave early; back late. That was our life. A quick peck in the morning and no-time-for-breakfast-dear. Tiptoes late at night, and the sheets rustle and the mattress sags; and it was hardly enough even to ruffle your sleep. Always on the run; always working late. One of us would have to slow down, or we might never meet at all.

My first thought was that I might give Consuela the night off. It had been so long since Brenda and I had been alone together. My second thought was that she had gotten in trouble at the office and had lost her job.

Doctors make good money. Lawyers make good money. Doctors married to lawyers make *very* good money. It was not enough.

"Brenda?" I called as I entered the kitchen from the garage. "I'm home!" There was no one in the kitchen; though something tangy with orange and sage was baking in the oven. "Brenda?" I called again as I reached the hall closet.

A squeal from upstairs. "Daddy's home!"

I hung up my overcoat. "Hello, Dee-dee. Is Mommy with you?" Unlikely, but possible. Stranger things have happened.

"No." Followed by a long silence. "Connie is telling me a story, about a mule and an ox."

Another silence; then footsteps on the stairs. Consuela looked at me over the banister as she descended.

"The mule and the ox?" I said.

"Nothing," she replied curtly. "An old Mayan folk tale."

"Where's Brenda?" I asked her. "I know she's home; her car is in the garage." Maybe she was in the back yard, by the pool or in the woods.

No, she didn't like the woods; she was afraid of deer ticks.

"Mrs. Wilkes came home early," Consuela said, "and packed a bag—"

Mentally, I froze. Not *this*. Not *now*. Without Brenda's income.... "Packed a bag? Why?"

"She said she must go to Washington for a few days, to assist in an argument before the Supreme Court."

"Oh." Sudden relief coupled with sudden irritation. She could have phoned. At the Home. In my car. I showed Consuela my teeth. "The Supreme Court, you say. Well. That's quite a feather in her cap."

"Were she an Indio, a feather in the cap might mean something."

"Consuela. A joke? Did Brenda say when she would be back?"

Consuela hesitated, then shook her head. "She came home, packed her

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bag, gave me instructions. When the car arrived, she left."

And never said good-bye to Dee-dee. Maybe a wave from the doorway, a crueler good-bye than none at all. "What sort of instructions?" That wasn't the question I wanted to ask. I wanted to ask whose car picked her up. Whom she was assisting in Washington? Walther Crowe, the steel-eyed senior partner with the smooth, European mannerisms? FitzPatrick, the young comer who figured so often on the society pages? But Consuela would not know; or, if she did, she would not say. There were some places where an outsider did not deliberately set herself.

"The sort of instructions," she replied, "that are unnecessary to give a professional. But they were only to let me know that I was her employee."

"You're angry." I received no answer. Then I asked, "Have you and Dee-dee eaten yet?"

"No." A short answer, not quite a retort.

"I didn't pull rank on you. Brenda did."

She shrugged and looked up at me with her head cocked to the side. "You are a doctor; I am a nurse. We have a professional relationship. Mrs. Wilkes is only an employer."

She was in a bad mood. I had never seen her angry before. I wondered what patronizing tone Brenda had used with her. I always made the effort to treat Consuela as an equal; but Brenda seldom did. Sometimes I thought Brenda was half-afraid of our Deirdre's nurse; though for what reason, I could not say. I glanced at the overcoat in the closet. "Would you and Dee-dee like to go out to eat?"

She gave me a thoughtful look; then shook her head. "She will not leave the house."

I glanced at the stairs. "No, she'll not budge, will she?" It was an old argument, never won. "She can play outside. She can go to school with the other children. There is no medical reason to stay in her—"

"There is something wrong with her heart."

"No, it's too soon for—"

"There is something wrong with her heart," she repeated.

"Oh." I looked away. "But. . . . We'll eat in the dining room today. The three of us. Whatever that is you have in the oven. I'll set the table with the good dinnerware."

"A special occasion?"

I shook my head. "No. Only maybe we each have a reason to be unhappy just now." I wondered if Brenda had left a message in the bedroom. Some hint as to when she'd return. I headed toward the dining room.

"The ox was weary of plowing," Consuela said.

"Eh?" I turned and looked back at her. "What was that?"

"The ox was weary of plowing. All day, up the field and down, while the farmer cracked the whip behind him. Each night in the barn, when the ox complained, the mule would laugh. 'If you detest the plowing so much, why do it?' 'It is my job, señor mule,' the ox would reply. 'Then do it and don't complain. Otherwise, refuse. Go on strike.' The ox thought about

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this and, several days later, when the farmer came to him with the harness, the ox would not budge. 'What is wrong, señor ox?' the farmer asked him. 'I am on strike,' the ox replied. 'All day I plow with no rest. I deserve a rest.' The farmer nodded. 'There is justice in what you say. You have worked hard. Yet the fields must be plowed before the rains come.' And so he hitched the mule to the plow and cracked the whip over him, and worked him for many weeks until the plowing was done."

Consuela stopped, and with a slight gesture of the head turned for the kitchen.

Although entitled to two evenings a week off, Consuela seldom took them, preferring the solitude of her own room. She lived there quietly, usually with the hall door closed; always with the connecting door to Dee-dee's room open. Once a month she sent a check to Guatemala. She read books. Sometimes she played softly on a sort of flute: weird, serpentine melodies that she had brought with her from the jungle. More than once, the strange notes had caused Brenda to stop whatever she was doing, whether mending or reading law or even making love, and listen with her head cocked until the music stopped. Then she would shiver slightly, and resume whatever she had been doing as though nothing had happened.

Consuela had furnished her room with Meso-American bric-a-brac. Colorful, twisty things. Statuettes, wall hangings, a window treatment. Squat little figurines with secretive, knowing smiles. A garland of fabric flowers. An obsidian carving that suggested a panther in mid-leap. Brenda found it all vaguely disturbing, as if she expected chittering monkeys swinging from the bookshelves and curtains; as if Consuela had brought a part of the jungle with her into Brenda's clear, ordered, rational world. It wasn't proper, at all. It was somehow out of control.

"Did you like having dinner downstairs today?" I asked Dee-dee as I studied Consuela's room through the connecting door. The flute lay silent on Consuela's dresser top. It was the kind you blew straight into, with two rows of holes, one for each hand.

"It was OK, I guess." A weak voice, steady but faint.

I turned around. "Only OK?" There was an odd contrast here, a paradox. Although it was evening and Deirdre's room was shrouded in darkness, Consuela's room had seemed bright with rioting colors.

"Did I leave any toys downstairs?" A worried voice in the darkness. Anxious.

"No, I checked." I resolved to check again, just in case we had overlooked something that had rolled under the sofa. Brenda detested disorder. She did not like finding things out of place.

"Mommy won't mind, will she? That I ate downstairs."

I turned. "Not if we don't tell her. Mommy will be at the Supreme Court for a few days."

Dee-dee made a sound in her throat. No sorrow, no joy. Just ac-

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knowledgment. Mommy might never come home at all for all the difference it made in Dee-dee's life. "Ready to be tucked in?"

Dee-dee grinned a delicious smile and snuggled deeper into the sheets. It was a heartbreaking smile. I gave her back the best one I could muster, and took a long, slow step toward the bed. She shrieked and ducked under the covers. I waited until she peeked out and took another step. It was a game we played, every move as encrusted with ritual as a Roman Mass.

Hutchinson-Gilford Syndrome. Dee-dee's smile was snaggle-toothed. Her hair, sparse; her skin, thin and yellow.

Manifestations: Alopecia, onset at birth to eighteen months, with degeneration of hair follicles. Thin skin. Hypoplasia of the nails.... I had read the entry in *Smith's* over and over, looking for the one item I had missed, the loophole I had overlooked. It was committed to memory now; like a mantra. *Periarticular fibrosis; stiff or partially flexed prominent joints. Skeletal hypoplasia, dysphasia and degeneration.*

Dee-dee had weighed 2.7 kilos at birth. Her fontanel had ossified late, but the slowness of her growth had not become apparent until seven months. She lagged the normal growth charts by one-third. When she lost hair, it did not grow back. Her skin had brownish-yellow "liver" spots.

Natural history: Deficit of growth becomes severe after one year. The tendency to fatigue easily may limit participation in childhood activities. Intelligence and brain development are unimpaired.

Deirdre Wilkes was an alert, active mind trapped in a body aging far too quickly. A shrunken little gnome of a ten-year old. *Etiology: Unknown.* I hugged her and kissed her on the cheek. Then I tucked the sheets tightly under the mattress.

Prognosis: The life span is shortened by relentless arterial atheromatosis. Death usually occurs at puberty.

There were no papers delivered on Hutchinson-Gilford that I had not crawled through word after word, searching for the slightest whisper of a breakthrough. Some sign along the horizon of research. But there were no hints. There were no loopholes.

Prognosis: death.

There were no exceptions.

Deirdre could smile because she was only a child and could not comprehend what was happening to her body. She knew she would have to "go away" someday, but she didn't know what that really meant.

Smiling was the hardest part of the game.

Come along, Josephine, In my flying machine.
We'll go up in the air....

How can I explain the feelings of dread and depression that enveloped me every time I entered Sunny Dale? I was surrounded by ancients. Bent, gray, hobbling creatures forever muttering over events long forgotten or families never seen. And always repeating their statements, always repeating their statements, as if it were

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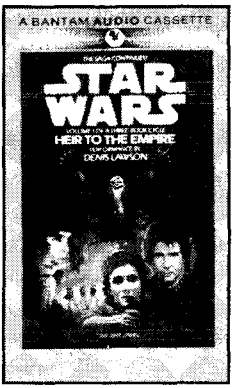

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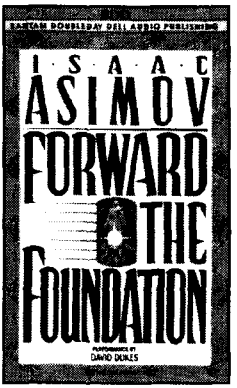

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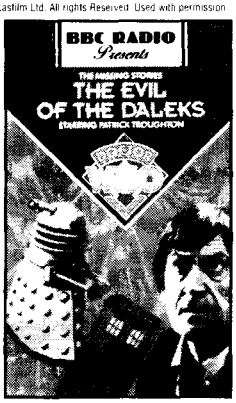

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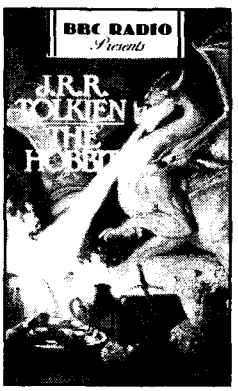

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I who were hard of hearing and not they. The Home was a waiting room for Death. Waiting and waiting, until they had done with waiting. Here is where the yellowed skin and the liver spots belonged. Here! Not on the frame of a ten-year-old.

The fourth time I saw Mae Holloway, she crept up behind me as I opened the door to the clinic. "Morning, doc," I heard her say.

"Good morning, Mrs. H.," I replied without turning around. I opened the door and stepped through. Inevitably, she followed, humming. I wondered if this was going to become a daily ritual. She planted herself in the visitor's chair. Somehow, it had become her own. "The show just ended," she announced. "Oh, it was a peach." She waved a hand at my desk. "Go on, set down. Make yourself pleasant."

It was my own fault, really. I had shown an interest in her tiresome recollections, and now she felt she had to share everything with me, as if I were one of her batty, old cronies. No good deed goes unpunished. Perhaps I was the only one who put up with her.

But I did have a notion that could wring a little use out of my sentence. I could write a book about Mae Holloway and her musical memories. People were fascinated with how the mind worked; or rather with how it failed to work. Sacks had described similar cases of incontinent nostalgia in one of his books; and if he could make the best-seller lists with a collection of neurological case studies, why not I? With fame, came money; and the things money could buy.

But my book would have to be something new, something different; not just a retelling of the same neurological tales. The teleology, perhaps. Sacks had failed to discover any meaning to the music his patients had heard, any reason *why* this tune or that was rememb-heard. If I kept a record, I might discover enough of a pattern to form the basis of a book. I rummaged in my desk drawer and took out a set of file cards that I had bought to make notes on my patients. Might as well get started. I poised my pen over a card. "What show was that?" I asked.

"*Girl of the Golden West*. David Belasco's new stage play." She shook her head. "I first seen it, oh, years and years ago, in Pittsburgh; before they made it a high falutin' opera. That final scene, where Dick Johnson is hiding in the attic, and his blood drips through the ceiling onto the sheriff. That was taken from real life, you know."

"Was it." I wrote *Girl of the Golden West* and *doubling episode* and made a note to look it up. Then I poised my pen over a fresh card. "I'd like to ask you a few questions about your music, Mrs. Holloway. That is, if you don't mind."

She gave me a surprised glance and looked secretly pleased. She fussed with her gown and settled herself into her seat. "You may fire when ready, Gridley."

"You *are* still hearing the music, aren't you, Mrs. Holloway?"

"Well, the songs aren't so loud as they were. They don't keep me awake

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anymore; but if I concentrate, I can hear 'em."

I made a note. "You've learned to filter them out, that's all."

"If You Talk in Your Sleep, Don't Mention My Name."

"What?"

" 'If You Talk in Your Sleep, Don't Mention My Name.' That was one of 'em. The tunes I been hearing. Go on, write that down. Songs were getting real speedy in those days. There was 'Mary Took the Calves to the Dairy Show' and 'This is No Place for a Minister's Son.' Heh-heh. The blues was all in a lather over 'em. That, and actor-folks actually kissing each other in the moving picture shows. They tried to get that banned. And the animal dances, too."

"Animal dances?"

"Oh, there were a passel of 'em," she said. "There was the kangaroo dip, the crab step, the fox trot, the fish walk, the bunny hug, the lame duck.... I don't remember them all."

"The fox trot," I offered. "I think people still dance that."

Mae snorted. "All the fire's out of it. You should have read what the preachers and the newspapers had to say about it back then. They sure were peeved; but the kids thought it was flossy. It was a way to get their parents' goat. 'Bug them,' I guess you say now."

"Kids? Isn't the fox trot a ballroom dance for, well, you know—mature people?"

She made her sour-lemon face. "Sure. Now. But today's old folks were yesterday's kids. And they still like the music they liked when they were young. Heh-heh. When you're ninety or a hundred, sonny, you'll be a-listening to that acid rock and telling your grandkids what hell-raisers you used to be. And they won't believe you, either. We tote the same bags with us all our lives, doc. The same interests; the same likes and dislikes. Those older'n us and those younger'n us, why, they have their own bags." A sudden scowl, halfway between fright and puzzlement, passed across her face like the shadow of a cloud. Then she hunched her shoulders. "Me, I've got too many bags."

She'd get no argument from me on that. "Have you heard any other songs?" I asked.

She folded her hands over the knob of her walking stick and rested her chin on them. "Let's see.... Yesterday, I heared, heard 'Waiting for the Robert E. Lee' and 'A Perfect Day.' Those were real popular, once. And lots of Cohan songs. 'Oh, it was Mary, Mary, long before the fashion changed....' And 'Rosie O'Grady.' Then there was 'Memphis Blues.' Young folks thought it was 'hep.' Even better than ragtime."

She shook her head. "I never cottoned too well to those kids, though," she said. "They remind me of the kids nowadays. A little too.... What do you say now? 'Close to the edge.' Ran wild when they were young 'uns, they did. Hung around barbershops. Hawked papers as newsies. Worked the growler for their old man."

I looked up from my notes. "Worked the growler?"

"Took the beer bucket to the sa-

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loon to get it filled. Imagine sending a child—even girls!—into a saloon! No wonder Carrie and the others wanted to close 'em up. Maybe folks my age were a little too stuck on ourselves, like the younger folks said; but at least we had principles. With us, it wasn't all just to have a good time. We fought for things worth fighting for. Suffrage. Prohibition. Birth control. Oh, those were times, I tell you. Maggie, making those speeches about birth control and standing up there on the stage that one time with the tape over her mouth, because they wouldn't let her talk. I helped her open that clinic of hers over in Brooklyn, though I never did care for her attitude about Jews and coloreds. Controlling 'undesirables' wasn't the real reason for birth control, anyway."

"Mrs. Holloway!"

She looked at me and laughed. "Now, don't tell me *your* generation is shocked at such talk!"

"It's not that. It's—"

"That old folks wrangled over it, too? Well, folks aren't born old. We were young, too; and as full of piss and vinegar as anyone else. I read *Moral Physiology* when it first come out; though Mister did try mightily to discourage me. And, later, there was *The Unwelcomed Child.* Doc, if men had babies, birth control would never have been a crime."

Folks aren't born old. . . . I squared off my deck of index cards. "I suppose not." My generation had been as strong as any for civil rights and feminism. Certainly stronger than the hard-edged cynics coming up behind us. It sounded as if Mae had had a similar generational experience. Though, that would put her in the generation *before* the hell-raising Lost Generation. What was it called? The Missionary Generation? Maybe she was older than she looked; though that hardly seemed possible. "Let's get back to the songs—" I suggested.

"Yes, the songs," she said. "The songs. Why, I recollect a man had a right good voice. Now what was his name. . . ? A wonderful dancer, too."

"Ben Wickman?" I suggested.

"No. No, Ben was later. This was out Pittsburgh way. Joe Paxton. That was it." She tilted her head back. "He was a barnstormer, Joe was. He knew 'em all. Calbraith Rodgers, Glenn Curtiss, Pancho Barnes, even Wilbur Wright. Took me up once, through the Alleghenies. Oh, my, that was something, let me tell you. The wind in your face and the ground drifting by beneath you, and the golden Sun peeking between the shoulders of the hills. . . . And you felt you were dancing with the clouds." She sighed, and the light in her eyes slowly faded. "But he was like all the rest." Her face closed up; became hard. "I come on him one day packing his valise, and when I asked him why he was cutting out, all he could say was, 'How old is Ann?' "

"What?"

She blinked and focused moistened eyes on me. Slowly, before they could even fall, her tears vanished into the sand of her soul. "Oh, that's what everyone said back then. 'How old is Ann?' It meant 'Who knows?' Came

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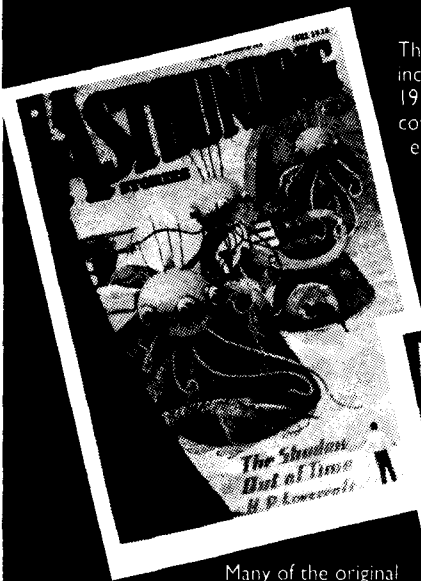

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from one of those brain teasers that ran in the *New York Press*. You know. 'If Mary is twice as old as Ann was when Mary . . . ' And it goes through all sorts of contortions and ends up 'How old is Ann?' Most folks hadn't the foggiest notion and didn't care, so they started saying 'How old is Ann?' when they didn't know the answer to something." She pushed down on her walking stick and started to rise.

"Wait. I still have a few questions."

"Well, I don't have any more answers. Joe, well, he turned out worthless in the end; but we had some high times together." Then she sighed and looked off into the distance. "And he did take me flying, once, when flying was more than just a ride."

As I was walking down the street,
down the street, down the street,
A handsome gal I chanced to meet.
Oh, she was fair to view.
Lovely Fan', won't you come out tonight, come out tonight, come out tonight?
Lovely Fan', won't you come out tonight, and dance by the light of the moon?

It was late in the evening—midnight, perhaps—and, dressed in housecoat and slippers, I was frowning over a legal pad and a few dozen index cards, a cup of cold coffee beside me on the kitchen table. I was surrounded by small, sourceless sounds. If you have been in a sleeping building at night, you know what I mean. Creaks and rustlings and the sighs of . . . what? Spirits? Air circulation vents? The soft groan of settling timbers. The breath of the wind against the windows. The staccato scritching of tiny night creatures dancing across the roof shingles. The distant rumble of a red-eye flight making its descent into the metropolitan area. Among such confused, muttering sounds, who can distinguish the pad of bare feet on the floor?

A gasp, and I turned.

I had never seen Consuela when she was not wearing nurse's whites. Perhaps once or twice, bundled in a coat as she sought one of her rare nights out; but never in a red and yellow flowing flowered robe. Never with her black hair unfastened and sweeping around her like a raven-feather cape. She stood in the kitchen doorway, clenching the robe's collar in her fist.

"Consuela," I said.

"I—saw the light on. I thought you had already gone to sleep. So I—" Consuela flustered was a new sight, too. She turned to go. "I did not mean to disturb you."

"No, no. Stay a while." I laid my pen down and stretched. "I couldn't get to sleep, so I came down here to work a while." When she hesitated, I stood and pulled a chair out for her. She gave me a sidelong look, then bobbed her head once and took a seat. I wondered if she thought I might "try something." Late at night; wife away; both of us in pajamas, thoughts of bed in our minds. Hell, *I* wondered if I might try something. Brenda had grown more distant each year since Deirdre's birth.

But Consuela was not my type. She was too short, too wide, too dark. I

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studied her covertly while I handled her chair. Well, perhaps not "too." And she did have a liquid grace to her, like a panther striding through the jungle. Brenda's grace was of a different sort. Brenda was fireworks arcing and bursting across the night sky. You might get burnt, but never bitten.

"Would you like something to drink?" I asked when she had gotten settled. "Apple juice, orange juice." Too late for coffee; and a liqueur would have been inappropriate.

"Orange juice would be fine, thank you," she said.

I went to the refrigerator and removed the carafe. Like everyone else, we buy our OJ in wax-coated paperboard containers; but Brenda transferred the milk, the juices, and half a dozen other articles into carafes and canisters and other more appropriate receptacles. Most people shelved their groceries. We repackaged ours.

"Do you remember the old woman I told you about last week?"

"The one who hears music? Yes."

I brought the glasses to the table. "She's starting to remember other things, now." I told her about Mae's recollections, her consciousness doubling. "I've started to keep track of what she sees and hears," I said, indicating the papers on the table. "And I've sent to the military archives to see if they could locate Green Holloway's service records. Later this week, I plan to go into the City to check the census records at the National Archives."

Consuela picked up the legal pad and glanced at it. "Why are you doing this thing?"

"For verification. I'm thinking I might write a book."

She looked at me. "About Mrs. Holloway?"

"Yes. And I think I may have found an angle, too." I pointed to the pad she held. "That is a list of the songs and events Holloway has remembheard."

After a moment's hesitation, Consuela read through the list. She shook her head. "You are looking for meaning in this?" Her voice held a twist of skepticism in it. For a moment, I saw how my activities might look from her perspective. Searching for meaning in the remembered songs of a half-senile old woman. What should that be called, senemancy? Melodimancy? What sort of auguries did High Priest Wilkes find, eviscerating this morning's ditties?

"Not meaning," I said. "Pattern. Explanation. Some way to make sense of what she is going through."

Consuela gave me that blank look she liked to affect. "It may not make sense."

"But it almost does." I riffed the stack of index cards. Each card held information about a song Mae had heard. The composer, songwriter, performer; the date, the topic, the genre. Whether Mae had liked it or not. "The first time she came to me," I said, "she was 'rememb-hearing' swing tunes from the 1930s. A few days later, it was music of the 'Roaring Twenties.' Then the jazz gave way to George M. Cohan and the 'animal dance' music of the Mauve Decade. Do you see? The songs keep coming

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from earlier in her life."

"Memphis Blues," 1912. "A Perfect Day," 1910. "Mary Took the Calves to the Dairy Show," 1909. "Rosie O Grady," 1906. Songs my grandparents heard as children. "East side, west side, All around the town. . . ." I remembered how Granny used to sit my brother and me on her lap, one on each knee, and rock us back and forth while she sang that. I paused and cocked my head, listening into the silence of the night.

But I could hear nothing. I could remember *that* she sang it; but I could not remember the singing.

"It is a voyage," I said, loudly, to fill the silence. "A voyage of discovery up the stream of time."

Consuela shook her head. "Rivers have rapids," she said, "and falls."

Hello, my baby, hello, my honey,
hello, my ragtime gal . . .
Send me a kiss by wire,
Baby, my heart's on fire.

Mae's morning visit fell into a routine. She settled herself into her chair with an air of proprietorship and croaked out snatches of tunes while I wrote down what I could, recording the rest on a cheap pocket tape recorder I had purchased. She hummed "The Maple Leaf Rag" and "Grace and Beauty" and the "St. Louis Tickle." I suffered through her renditions of "My Gal Sal" and "The Rosary." ("A big hit," she assured me, "for over twenty-five years.") She rememb-heard the bawdy "Hot Time in the Old Town Tonight" (sounding grotesque on her ancient lips), the raggy "You've Been a Good Old Wagon, But You've Done Broke Down," and the poignant "Good-bye, Dolly Gray."

She frowned for a moment. "Or was that 'Nellie Gray'?" Then she shrugged. "Those were happy songs, mostly," she said. "Oh, they were such good songs back then. Not like today, all angry and shouting. Even the sad songs were sweet. Like 'Tell Them that You Saw Me' or 'She's Only a Bird in a Gilded Cage.' And Mister taught me 'Lorena,' once. I wish I could recollect that 'un. And 'Barbry Ellen.' I learned me that 'un when I was knee-high to a grasshopper. Pa told me it was the President's favorite song. The old President, from when his Pappy fought in the War. I haven't heard those yet. Or—" She cocked her head to the side. "Well, dad-blast it!"

"What's wrong, Mrs. Holloway?"

"I'm starting to hear coon songs."

"Coon songs!"

She shook her head. "Coon songs. They was—were—all the rage. 'Coon, Coon, Coon' and 'All Coons Look Alike to Me' and 'If the Man in the Moon were a Coon.' Some of them songs were writ by coloreds themselves, because they had to write what was popular if they wanted to make any money."

"Mrs. Holloway. . . !"

"Never said I liked 'em," she snapped back. "I met plenty of coloreds in my time, and there's some good and some bad, just like any other folks. Will Biddle, he farmed two hollers over from my Pa when I was a sprout, and he worked as hard as any man-jack in the hills, and car-

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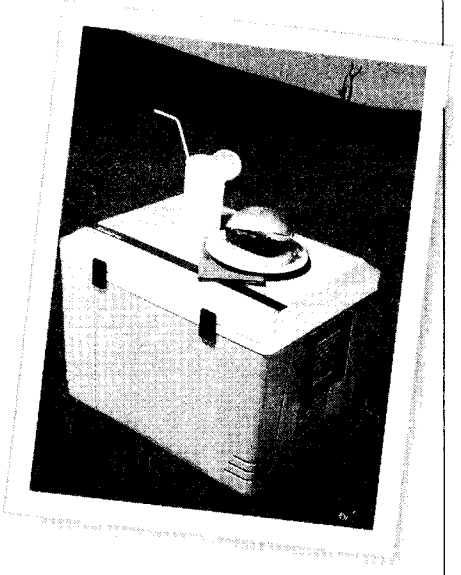

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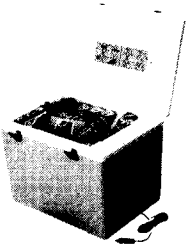

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ried water for no man. My Pa said—my Pa. . . ." She paused, frowned and shook her head. "Pa?"

"What is it?"

"Oh."

"Mrs. Holloway?"

She spoke in a whisper, not looking at me, not looking at anything I could see. "I remember when my Pa died. Him a-laying on the bed, all wore out by life. Gray and wrinkled and toothless. And, dear Lord, how that ached me. I remember thinking how he'd been such a strong man. Such a strong man." She sighed. "It's an old apartment, and the wallpaper is peeling off'n the walls. There's a big, dark water stain on one wall and the steam radiator is hissing like a cat."

"You don't remember where you were . . . are?" I asked, jotting a few quick notes.

She shook her head. "No. I'm humming 'In the Good Old Summertime.' Or maybe the tune is just running through my head. Pa, he. . . ." A tear formed in the corner of her eye. "He wants me to sing him the song."

"The song? What song is that?"

"An old, old song he used to love. 'Sing it to me one last time,' he says. And I can't sing at all because my throat's clenched up so tight. But he asks me again, and. . . . Those eyes of his! How I loved that old man." Mae's own eyes had glazed over as she lived the scene again in her mind. She reached out as if clasping another pair of hands in her own and croaked haltingly:

"I gaze on the moon as I tread the drear wild,
And feel that my mother now thinks of her child . . .
Be it ever so humble . . ."

She could not finish. For a time, she sobbed softly. Then she brushed her eye with her sleeve and looked past me. "I never knew, doc. I never knew at all what a blessing it was to forget."

Come and sit by my side if you love me.
Do not hasten to bid me adieu,
But remember the bright Mohawk Valley
And the girl that has loved you so true.

Later that day, as I was leaving the Home, I noticed Mae sitting in the common room and paused a moment to eavesdrop. There were a handful of other residents moldering in chairs and rockers; but Mae sat singing quietly to herself and I thought what the hell, and pulled out my pocket tape recorder and stepped up quietly beside her.

It was a patriotic hymn. "America, the Beautiful." I'm sure you've heard it. Even I know the words to that one. Enough to know that Mae had them all wrong. *Oh beautiful for halcyon skies? Above the enameled plain?* And the choruses. . . . The way Mae sang it, "God shed his grace for thee" sounded more like a plea than a statement.

America! America! God shed his grace for thee
Till selfish gain no longer stain The banner of the free!

The faulty recollection disturbed me. If Mae's memories were unreliable, then what of my book? What if

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my whole rationale turned out wrong?

Her croakings died away and she opened her eyes and spotted me. "Heading home, doc?"

"It's been a long day," I said. There was no sign on her face of her earlier melancholy, except that maybe her cheeks sagged a little lower than before, her eyes gazed a little more sadly. She seemed older, somehow; if such a thing were possible.

She patted the chair next to her. "Hot foot it on over," she said. "You're just in time for the slapstick."

She was obviously having another doubling episode, and, in some odd way, I was being asked to participate. I looked at my watch, but decided that since our morning session had been cut short, I might as well make the time up now. My next visit was not until Friday. If I waited until then, these memories could be lost.

"Slapstick?" I asked, taking the seat she had offered.

"You never been to the Shows?" She tsk-ed and shook her head. "Well, Jee-whiskers. They been the place to go ever since Tony Pastor got rid of the cootchee-cootchee and cleaned up his acts. A young man can take his steady there now and make goo-goo eyes." She nudged me with her elbow. "A fellow can be gay with his fairy up in the balcony."

I pulled away from her. "I beg your pardon?"

"Don't you want to be gay?" she asked.

"I should hope not! I have a wife, a dau—"

Mae laughed suddenly and capped a gnarled hand over her mouth. So help me, she blushed. "Oh, my goodness, me! I didn't mean were you a *cake-eater*. I got all mixed up. I was sitting down front at the burly-Q and I was sitting here in the TV room with you. When we said 'be gay,' we meant let your hair down and relax. And a 'fairy' was your girl friend, what they used to call a chicken when I was younger. All the boys wanted to be gay blades, with their starched collars and straw hats and spats. And their moustaches! You never saw such moustaches! Waxed and curled and barbered." She chuckled to herself. "I was a regular daisy, myself." She closed her eyes and leaned back.

"A regular daisy?"

"A daisy," she repeated. "Like in the song. Gals was going out to work in them days. So they made a song about it. Now, let me see. . . ." She pouted and stared closed-eyed at the sky. "How did that go?" She began to sing in a cracked, quavery voice.

"My daughter's as fine a young girl as you'll meet
In your travels day in and day out;
But she's getting high-toned and she's putting on airs
Since she has been working about. . . .
When she comes home at night from her office,
She walks in with a swag like a fighter;
And she says to her ma, 'Look at elegant me!'
Since my daughter plays on the typewriter.

She says she's a 'regular daisy,'
Uses slang 'til my poor heart is sore;
She now warbles snatches from

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operas
Where she used to sing 'Peggy O Moore.'
Now the red on her nails looks ignited;
She's bleached her hair 'til it's lighter.
Now perhaps I should always be mad at the man
That taught her to play the typewriter.

She cries in her sleep, 'Your letter's to hand.'
She calls her old father, 'esquire';
And the neighbors they shout
When my daughter turns out,
'There goes Bridget Typewriter Maguire.'"

When Mae was done, she laughed again and wiped tears from her eyes. "Law's sake," she said. "Girls a-working in the offices. I remember what a stir-up that was. Folks said secretarial was man's work, and women couldn't be good typewriters, no how. There was another song, 'Everybody Works But Father,' about how if women was to go to work, all the men would be out of jobs. Heh-heh. I swan! It weren't long afore one gal in four had herself a 'position,' like they used to say; and folks my age complained how the youngsters were 'going to pot.'" She shook her head and chuckled.

"I always did find those kids more to my taste," she went on. "There was something about 'em; some spark that I liked. They knew how to have fun without that ragged edge that the next batch had. And they had, I don't know, call it a dream. They were out to change the world. They sure weren't wishy-washy like the other folks my age. 'Middle-aged,' that's what the kids back then called us. We were 'Professor Tweetzers' and 'Miss Nancys' and 'goo-goos.' And to tell you the truth, Doc, I thought they pegged it right. People my age grew up trying to imitate their parents; until they saw how much more fun the kids were having. Then they tried to be just like their kids. Heh-heh."

I grunted something noncommital. Middle-aged crazy, just like my Uncle Larry. "I suppose there were a lot of 'mid-life crises' back then, too." I ventured. Uncle Larry had gone heavy into love beads and incense, radical politics. He grew a moustache and wore bell-bottoms. The whole hippie scene. Walked out on his wife for a young "chick" and thought it was all "groovy." I remember how pathetic those thirtysomething wannabes seemed to us in college.

Dad, now, he never had an "identity crisis." He always knew exactly who he was. He had gone off to Europe and saved the world, and then came back home and rebuilt it. Uncle Larry was too young to save the world in the Forties, and too old to save it in the Sixties. He was part of that bewildered, silent generation sandwiched between the heroes and the prophets.

"Neurasthenia," Mae said. "We called it neurasthenia back then. Seems everyone I knew was getting divorced or having an attack of 'the nerves.' Even the President was down in the mullygrubs when he was younger. Nervous breakdown. That's

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what you call it nowadays, isn't it? Now, T.R. There was a man with sand in him. Him and that 'strenuous life' he always preached about. Why, he'd fight a circle saw. Saw him that time in Milwaukee. Shot in the chest, and he still gave a stem-winder of a speech before he let them take him off. Did you know he got me in trouble one time?"

"Who, Teddy Roosevelt? How?"

"T.R., he was a-hunting and come on a bear cub; but he wouldn't shoot the poor thing because it wasn't the manly thing to do. So, some sharper started making stuffed animal dolls and called 'em Teddy's Bear. I given one to my neighbor child as a present." Mae slapped her knee. "Well, her ma had herself a conniption fit, 'cause the experts all said how animal dolls would give young 'uns the nightmares. And the other President who had the neurasthenia." Mae scowled and waved a hand in front of her face. "Oh, I know who it was," she said in an irritated voice. "That college professor. What was his name?"

"Wilson," I suggested, "Woodrow Wilson."

"That's the one. I think he was always jealous of T.R. He wouldn't let him take the Rough Riders into the Great War."

I started to make some comment, but Mae's mouth dropped open. "The war...?" she whispered. "The war! Oh, Mister...." Her face crumpled. "Oh, Mister! You're too old!" She covered her face and began to weep.

She felt in her sleeves for a handkerchief; then wiped her eyes and looked at me. "I forgot," she said. "I forgot. It was the war. Mister went away to the war. That's why he never come back. He never run out on me, at all. He would have come back after it was over, if he'd still been alive. He would have."

"I'm sure he would have," I said awkwardly.

"I told him he was too old for that sort of thing; but he just laughed and said it was a good cause and they needed men like him to spunk up the young 'uns. So he marched away one day and someone he never met before shot him dead, and I don't even know when and where it happened."

"I'm sorry," I said, at a loss for anything else to say. A good cause? The War to End All Wars, nearly forgotten now; its players, comic-opera Ruritanians on herky-jerky black and white newsreels. The last war begun in innocence.

Her hands had twisted the handkerchief into a knot. She fussed with it, straightened it out on her lap, smoothed it with her hand. In a quiet voice, she said, "Tell me, doc. Tell me. Why do they have wars?"

I shook my head. Was there ever a good reason? To make the world safe for democracy? To stop the death camps? To free the slaves? Maybe. Those were better reasons than cheap oil. But up close, no matter what the reason, it was husbands and sons and brothers who never came home.

Oh, them golden slippers, Oh, them golden slippers

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Golden slippers I'm gonna wear, Because they look so neat;
Oh, them golden slippers, Oh, them golden slippers,
Golden slippers I'm gonna wear To walk them golden streets.

Ever since our late evening encounter, Consuela had begun wearing blouses, skirts, and robes around the house instead of her nurse's whites. The colors were bright, even garish; the patterns, blocky and intricate. The costumes made the woman more open, less mysterious. It was as if, having once seen her *deshabille*, a barrier had come down. She had begun teaching Dee-dee to play the cane flute. Sometimes I heard them in the evening, the notes drifting down from above stairs, lingering in the air. Was it a signal, I wondered? I sensed that the relationship between Consuela and myself had changed; but in what direction, I did not know.

Dee-dee should have been in school. She should have been in fifth grade; and she should have come home on the school bus, full of laughter and bursting to tell us what she had learned that day. Brenda and I should have helped her with her homework, nursed her bruises, and hugged her when she cried. That was the natural order of things.

But Dee-dee lived in her room, played in the dark. She studied at home, tutored by Consuela or myself or by private instructors we sometimes hired. School and other children were far away. She was a prisoner, half of her mother's strained disapproval, half of her own withdrawal. Save for Consuela and myself and a few, brief contacts with Brenda, she had no other person in her short, bounded life. Who could dream what scenarios her dolls performed in the silence of her room?

I found the two of them at the kitchen table Consuela with her inevitable cocoa, Dee-dee with a glass of milk and a stack of graham crackers. There were cracker crumbs scattered across the Formica and a ring of white across Dee-dee's lip.

I beamed at her. "The princess has come down from her tower once more!"

She tucked her head in a little. "It's all right, isn't it?"

I kissed her on the forehead. How sparse her hair had grown! "Of course, it is!"

I settled myself across the table from Consuela. She was wearing an ivory blouse with a square-cut neck bordered by red stitching in the shape of flowers. "Thank you, nurse," I said. "She should be downstairs more often."

"Yes, I know."

Was there a hint of disapproval there? A slight drawing together of the lips? I wanted to make excuses for Brenda. It was not that Brenda made Dee-dee stay in her room, but that she never made her leave. It was Deirdre who stayed always by herself. "So, what did you do today, Dee-dee?"

"Oh, nothing. I read my schoolbooks. Watched TV. I helped Connie bake a cake."

"Did you? Sounds like a pretty busy day to me."

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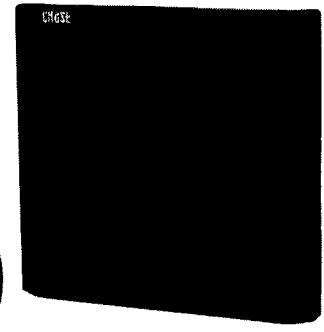

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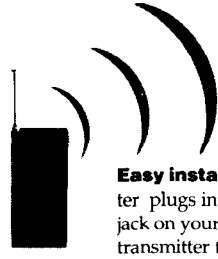

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She and Consuela shared a grin with each other. "We played ball, a little, until I got tired. And then we played word games. I see something . . . blue! What is it?"

"The sky?"

"I can't see the sky from here. It's long and thin."

"Hmm. Long, thin and blue. Spaghetti with blueberry sauce?"

Dee-dee laughed. "No, silly. It has a knot in it."

"Hmm. I can't imagine what it could be." I straightened my tie and Dee-dee laughed again. I looked down at the tie and gave a mock start. "Wait! Long, thin, blue and a knot. . . . It's my belt!"

"No! It's your tie!"

"My tie? Why. . . ." I gave her a look of total amazement. "Why, you're absolutely, positively right. Now, why didn't I see that? It was right under my nose. Imagine missing something right under your nose!"

We played a few more rounds of "I see something" and then Dee-dee wandered back to the family room and settled on the floor in front of the TV. I watched her for a while as she stared at the pictures flickering there. I thought of how little time was left before cartoons would play unwatched.

Consuela placed a cup of coffee in front of me. I sipped from it absently while I sorted through the day's mail stacked on the table. "Brenda will be coming home on Monday," I said. Consuela already knew that and I knew that she knew, so I don't know why I said it.

But why Monday? Why not Friday? Why spend another weekend in Washington with Walther Crowe? I could think of any number of reasons, I could.

"Deirdre will be happy to have her mother back," Consuela said in flat tones. I was looking at the envelopes, so I did not see her face. I knew what she meant, though. No more flute lessons; no more games downstairs. I reached across the table and placed my hand atop one of hers. It was warm, probably from holding the cocoa mug.

"Deirdre's mother never left," I said.

Consuela looked away. "I am only her nurse."

"You take care of her. That's more—" I caught myself. I had started to say that that was more than Brenda did; but there were some things that husbands did not say about their wives to other women. I noticed, however, that Consuela had not pulled her hand away from mine.

I released her hand. "Say, here's a letter from the National Archives." I said with forced heartiness, dancing away from the sudden abyss that had yawned open before me. Too many lives had been ruined by reading invitations where none were written.

Consuela stood and turned away, taking her cup to the sink. I slit the envelope open with my index finger and pulled out the yellow flimsy. *Veteran: Holloway, Green. Branch of Service: Infantry (Co. H, 5th Tennessee). Years of Service:1918 or 1919.* It was the order form I had sent to the Military Service Records department after Mae's earlier recollection of her

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husband. As I unfolded it, Consuela came and stood beside me, reading over my shoulder. Somehow, it was not uncomfortable.

☑ *We were unable to complete your request as written.*

☑ *We found additional pension and military service files of the same name (or similar variations).*

☑ *The enclosed records are those which best match the information provided. Please resubmit, if these are not the desired files.*

I grunted and paged through the sheets. Company muster rolls. A Memorandum of Prisoner of War Records: *Paroled and exchanged at Cumberland Gap, Sept. 5 '62.*

The last page was a white photocopy of a form printed in an old-fashioned typeface. **Casualty Sheet**. The blanks were penned in by an elegant Spencerian hand. Name, *Green Holloway*. Rank, *Private*. Company *"H"*, Regiment *5"*. Division, *3"*. Corps, *23"*. Arm, *Inf.* State, *Tenn.*

Nature of casualty, *Bullet wound of chest (fatal).*

Place of casualty, *Resaca, Ga.*

Date of casualty, *May 14, 1864, the regiment being in action that date.*

Jno. T. Henry, Clerk

I tossed the sheets to the kitchen table. "These can't be right," I said.

Consuela picked them up. "What is wrong?"

"Right name, wrong war. These are for a Green Holloway who died in the Civil War."

Consuela raised an eyebrow. "And who served in the same company as your patient's husband?"

"State militia regiments were raised locally, and the same families served in them, generation after generation. Green here was probably 'Mister's' grandfather. Back then children were often given their grandparents' names." I took the photocopies from Consuela and stuffed them back in the envelope. "Well, there was a waste of ten dollars." I dropped the envelope on the table.

Dee-dee called from the family room. "What's this big book you brought home?"

"*The Encyclopedia of Song*," I said over my shoulder. "It's to help me with a patient I have."

"The old lady who hears music?"

I turned in my chair. "Yes. Did Connie tell you about her?"

Dee-dee nodded her head. "I wish I could hear music like that. You wouldn't need headphones or a Walkman, would you?"

I remembered that Mae had had two very unhappy recollections in one day. "No," I said, "but you don't get to pick the station, either."

Later that evening, after Dee-dee had been tucked away, I spread my index cards and sheets of paper over the kitchen table, and arranged the tape recorder on my left where I could replay it as needed. The song encyclopedia lay in front of me, open to its index. A pot of coffee stood ready on my right.

Consuela no longer retreated to her own room after dinner. When I looked up from my work I could see her, relaxed on the sofa in the family room, quietly reading a book. Her

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shoes off, her legs tucked up underneath her, the way some women sit curled up. I watched her silently for a while. So serene, like a jaguar indolent upon a tree limb. She appeared unaware of my regard, and I bent again over my work before she looked up.

I soon verified that Mae's latest recollections were from the Gay Nineties. The earliest one, "Ta-Ra-Ra Boom-der-ay," had been written in 1890, and the others dated from the same era. "Good-bye, Dollie Gray," had been a favorite of the soldiers going off to fight in the Philippine "insurrection," while "Hot Time in the Old Town" had been the Rough Riders' "theme song." Mae's version of "America the Beautiful," I discovered, was the original 1895 lyrics. Apparently, Katherine Lee Bates had written the song as much for protest as for patriotism.

When I had finished the cataloging I closed the songbook, leaned back in my chair, and stretched my arms over my head. Consuela looked up at the motion; I smiled at her and she smiled back. I checked my watch. "Almost bed time," I said. Consuela said nothing, but nodded slightly.

Middle-aged?

The thought struck me like a discordant note and I turned back to my work. I ran the tape back and forth until I found what I was looking for. Yes. Mae had said that the "young folks" at the turn of the century had called her age-mates "middle-aged." So Mae must have already been mature by then. How was that possible? At most, she might have been a teenager, one of the "young folks," herself.

Unless she had looked old for her age.

God! I stabbed the shut-off button with my forefinger.

After a moment, I ran the tape through again, listening for Mae's descriptions of her peers and her younger contemporaries. "Wishy-washy." Folks her age had been wishy-washy. Yet, in an earlier session, she had described her age-mates as moralistic. I flipped through my written notes until I found it.

Yes, just as I remembered. But, psychologically, that made no sense. Irresolute twenty-somethings do not mature into forty-something moralists. The irresolute become the two-sides-to-every-question types; the mediators, the compromisers, the peace-makers. The ones both sides despise—and miss desperately when they are gone. The moralists are no-compromise world-savers. They preach "prohibition," not "temperance."

The wild youth Mae remembered from the Ragtime Era and the Mauve Decade—the hard-edged "newsies"—those were the young Hemingways, Bogies and Mae Wests; the "Blood-and-Guts" Pattons and the "Give-'em-Hell" Harrys. The Lost Generation, they had been called. The idealistic, young teeners and twenty-somethings of the Gay Nineties that Mae found so simpatico were the young FDR, W.E.B. DuBois and Jane Addams. The generation of "missionaries" out to save the world. They had all been "the kids" to her. But that would put Mae into the even

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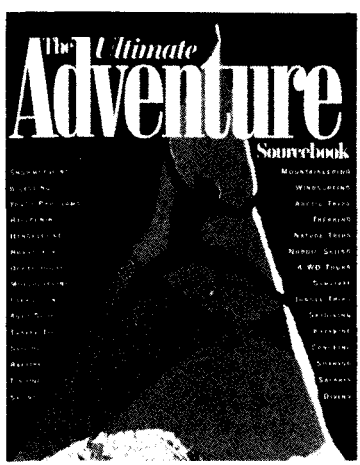

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older, Progressive Generation, a contemporary of T.R. and Edison and Booker T. Washington.

I drummed my pencil against the table top. That would make her 120 years old, or thereabouts. That wasn't possible, was it? I pushed myself from the table and went to the bookcase in the family room.

The Guinness Book of Records sat next to the dictionary, the thesaurus, the atlas and the almanac, all neatly racked together. Sometimes, Brenda's obsessive organizing paid off. I noticed that Dee-dee had left one of her own books, *The Boxcar Children*, on the shelf and made a mental note to return it to her room later.

According to *Guinness,* the oldest human being whose birth could be authenticated was Shigechiyo Izumi of Japan, who had died in 1986 at the ripe age of 120 years and 237 days. So, a few wheezing, stumbling geezers did manage to hang around that long. But not many. Actuarial tables suggested one life in two billion. So, with nearly six billion of us snorting and breathing and poking each other with our elbows, two or three such ancients were possible. Maybe, just maybe, Mae could match Izumi's record. The last surviving Progressive.

The oldest human being.

The oldest human being remembers.

The oldest human being remembers pop music of the last hundred years.

A Hundred-and-Twentysomething. Great book title. It had "best-seller" written all over it.

* * *

'Neath the chestnut tree, where the wild flow'rs grow,
And the stream ripples forth through the vale,
Where the birds shall warble their songs in spring,
There lay poor Lilly Dale.

On my next visit, Mae was not waiting by the office door for me to unlock it. So, after I had set my desk in order, I hung the "Back in a Minute" sign on the doorknob and went to look for her. Not that I was concerned. It was just that I had grown used to her garrulous presence.

I found Jimmy Kovacs in the common room watching one of those inane morning "news" shows. "Good morning, Jimmy. How's your back?"

He grinned at me. "Oh, I can't complain." He waited a beat. "They won't let me."

I smiled briefly. "Glad to hear it. Have you seen—"

"First hurt my back, oh, it must have been sixty-six, sixty-seven. Lifting forms."

"I know. You told me already. I'm looking for—"

"Not forms like paperwork. Though nowadays you could strain your back lifting them, too." He cackled at his feeble joke. It hadn't been funny the first two times, either. "No, I'm talking about those 600-pound forms we used to use on the old flatbed perfectors. Hot type. Blocks of lead quoined into big iron frames. Those days, printing magazines was a *job*, I tell you. You could smell the ink; you could feel the presses pound-

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ing through the floor and the heat from the molten lead in the linotypes." He shook his head. "I saw the old place once a few years back. A couple of prissy kids going ticky-ticky on those computer keyboards." He made typing motions with his two index fingers.

I interrupted before he could give me another disquisition on the decadence of the printing industry. I could just imagine the noise, the lead vapors, the heavy weight-lifting. Some people have odd notions about the Good Old Days. "Have you seen Mae this morning, Jimmy?"

"Who? Mae? Sure, I saw the old gal. She was headed for the gardens." He pointed vaguely.

Old gal? I chuckled at the pot calling the kettle black. But then I realized with a sudden shock that there were more years between Mae and Jimmy than there were between Jimmy and me. There was old, and then there was *old.* Perhaps we should distinguish more carefully among them—say "fogies," "mossbacks" and "geezers."

Mae was sitting in the garden sunshine, against the red brick back wall, upon a stone settee. I watched her for a few moments from behind the large plate glass window. The Sun was from her right, illuminating the red and yellow blossoms around her and sparkling the morning dew like diamonds strewn across the grass. The dewdrops were matched by those on her cheeks. She wore a green print dress with flowers, so that the dress, the grass and the flower beds; the tears and the dew, all blended together, like old ladies' garden camouflage.

She did not see me coming. Her eyes were closed tight, looking upon another, different world. I stood beside her, unsure whether to rouse her. Were those tears of joy or tears of sorrow? Would it be right to interrupt either? I compromised by placing my hand on her shoulder. Her dry, birdlike claw reached up and pressed itself against mine.

"Is that you, Doctor Wilkes?" I don't know how she knew that. Perhaps her eyes had not been entirely closed. She opened them and looked at me, and I could see that her regurgitated memories had been sorrowful ones. That is the problem with Jackson's syndrome. You remember. You can't help remembering. "Oh, Doctor Wilkes. My mama. My sweet, sweet mama. She's dead."

The announcement did not astonish me. Had either of Mae Holloway's parents been alive I would have been astonished. I started to tell her that, but my words came out surprisingly gentle. "It happened a long time ago," I told her. "It's a hurt long over."

She shook her head. "No. It happened this morning. I saw Pa leaning over my bed. Oh, such a strong, young man he was! But he'd been crying. His eyes were red and his beard and hair weren't combed. He told me that my mama was dead at last and she weren't a-hurtin' no more."

Mae Holloway pulled me down to sit beside her on the hard, cold bench, and she curled against me for

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all the world like a little girl. I hesitated and almost pulled away; but I am not without pity, even for an old woman who half-thought she was a child.

"He told me it was my fault."

"What?" Her voice had been muffled against my jacket.

"He told me it was my fault."

"Who? Your father told you that? That was . . . cruel."

She spoke in a high-pitched, childish voice. "He tol' me that mama never gotten well since I was borned. There was something about my birthin' that hurt her inside. I was six and I never seen my mama when she weren't a-bed. . . ."

She couldn't finish. Awkwardly, I put an arm around her shoulder. A husband who lost his wife to childbirth would blame the child, whether consciously or not. Especially a husband in the full flush of youth. Worse still, if it was a lingering death. If for years the juices of life had drained away, leaving a gasping, joyless husk behind.

If for years the juices of life had drained away, leaving a gasping, joyless husk behind.

"I have to get back to my office," I said, standing abruptly. "There may be a patient waiting. Is there anything I can get you? A sedative?"

She shook her head slowly back and forth several times. When she spoke, she sounded more like an adult Mae. "No. No, thank you. I ain't—haven't had these memories for so long that I got to feel them now, even when it pains me. There'll be worse coming back to me, bye and bye. And better, too. The Good Man'll help me bear it."

It wasn't until I was back behind my desk and had made some notes about her recollection for my projected book that I was struck with an annoying inconsistency. If Mae's mother had died from complications of childbirth, where did her "little brother Zach" come from?

Step-brother, probably. A young man like her father would have sought a new bride before too long. Eventually, we put tragedy behind us and get on with life. But if I was going to analyze the progress of Mae's condition, I would need to confirm her recollections. After all, memories are tricky things. The memories of the old, trickier than most.

Peaches in the summertime,
Apples in the fall;
If I can't have the girl I love,
I won't have none at all.

There was music in the air when I returned home, and I followed the thread of it through the garage and into the back yard, where I found Consuela sitting on a blanket of red, orange and brown, swathed in a flowing, pale green muumuu, and Deirdre beside her playing on the cane flute. Dee-dee's thin, knobby fingers moved haltingly and the notes were flat, but I actually recognized the tune. Something about a spider and a waterspout.

"Hello, Dee-dee. Hello, Consuela."

Deirdre turned. "Daddy!" she said. She pulled herself erect on Consuela's gown and hobbled across the

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grass to me. I crouched down and hugged her. "Dee-dee, you're outside playing."

"Connie said it was all right."

"Of course, it's all right. I wish you would come out more often."

A cloud passed across the sunshine. "Connie said no one can see me in the yard." A hesitation. "And Mommy's not home."

No one to tell her how awful she looked. No cruel, taunting children. No thoughtlessly sympathetic adults offering useless condolences. Nothing but Connie, and me, and the afternoon sun. I looked over Dee-dee's shoulder: "Thank you, nur—Thank you, Connie."

She blinked at my use of her familiar name, but made no comment. "The sunshine is good for her."

"She *is* my sunshine. Aren't you, Dee-dee?" *You are my sunshine, my only sunshine.* A fragment of a tune. Only, how did the rest of it go?

"Oh, Daddy. . . ."

"So, has Connie been teaching you to play the flute?"

"Yes. And she showed me lots of things. Did you know there are zillions of different bugs in our grass?"

"Are there?" *You make me happy when skies are grey.*

"Yeah. There's ants and centipedes and . . . and mites? And honey bees. Honey bees like these little white flowers." And she showed me a ball of clover she had tucked behind her ear.

"You better watch that," I said, "or the bees will come after you, too."

"Oh, Daddy. . . ."

"Because you're so sweet." *You'll never know, dear, how much I love you.*

"Daaddyy. I saw some spiders, too."

"Going up in the waterspout?"

She giggled. "There are different kinds of spiders, too. They're like eensy-weensy tigers, Connie says. They eat flies and other bugs. Yuck! I wouldn't want to be a spider, would you?"

"No."

"But you are!" Secret triumph in her voice. She had just tricked me, somehow. "There was this spider that was nothing but a little brown ball with legs *this* long!" She held her arms far enough apart to cause horror movie buffs to blanch. "They named it after you," she added with another giggle. "They call it a Daddy-long-legs. You're a daddy and you have long legs, so you must be a spider, too."

"Then . . . I've got you in my web!" I grabbed her and she squealed. "And now I'm going to gobble you up!" I started kissing her on the cheeks. She giggled and made a pretense of escape. I held her all the tighter. *Please don't take my sunshine away.*

We sat for a while on the blanket, just the three of us. Consuela told us stories from Guatemala. How a rabbit had gotten deeply into debt and then tricked his creditors into eating one another. How a disobedient child was turned into a monkey. Dee-dee giggled at that and said she would *like* to be a monkey. I told them about Mae Holloway.

"She didn't give me any new songs

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today," I said, "but she finally remembered something from her childhood." I explained how her mother had died and her father had blamed her for it.

"Poor girl!" Consuela said, looking past me. "It's not right for a little girl to grow up without a mother."

"Deirdre Wilkes! What on *earth* are you doing out*side* in the *dirt?*"

Dee-dee stiffened in my arms. I turned and saw Brenda in the open garage door, straight as a rod. A navy blue business suit with white ruffled blouse. Matching overcoat, hanging open. A suitbag slung from one shoulder, a briefcase clenched in the other hand. "Brenda," I said, standing up with Dee-dee in my arms. "We didn't expect you until Monday."

She looked at each of us. "Evidently not."

"Dee-dee was just getting a little sunshine."

Brenda stepped close and whispered. "The neighbors might see."

I wanted to say, So what? But I held my peace. You learn there are times when it is best to say nothing at all. You learn.

"Nurse." She spoke to Consuela. "Aren't you dressed a bit casually?"

"Yes, señora. It is after five." When she had to, Consuela could remember what was in her contract.

"A professional does not watch the clock. And a professional dresses appropriately for her practice. How do you think it would look if I went to the office in blouse and skirt instead of a suit? Take Deirdre inside. Don't you know there are all sorts of bugs and dirt out here? What if she were stung by a bee? Or bitten by a deer tick?"

"Brenda," I said, "I don't think—"

She turned to me. "Yes, exactly. You didn't think. How could you have allowed this, Paul? Look, in her hand. That's Nurse's whistle, or whatever it is. Has Deirdre been playing it? Putting it in her mouth? How unsanitary! And there are weeds in her hair. For God's sake, Paul, you're a doctor. You should have said something."

Sometimes I thought Brenda had been raised in a sterile bubble. The least little thing out of place, the least little thing done wrong, was enough to set her off. Dust was a hanging offense. She hadn't always been that way. At school, she'd been reasonably tidy, but not obsessed. It had only been in the last few years that cleanliness and order had begun to consume her life. Each year, I could see the watch spring wound tighter and tighter.

Consuela bundled up flute, blanket, and Dee-dee, and took them inside, leaving me alone with Brenda. I tried to give here a hug, and she endured it briefly. "Welcome home."

"Christ, Paul. I go away for two weeks and everything is falling apart."

"No, Nurse was right to bring her outside. Deirdre should have as much normal activity as possible. There is nothing wrong with her mind. It's just her body aging too fast." That wasn't strictly true. Hutchinson-Gilford was sometimes called *progeria*, but it differed in some of its particulars from normal senile aging.

Brenda swatted at a swarm of midges. "There are too many bugs

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out here," she said. "Let's go inside. Carry my suitbag for me."

I took it from her and followed her inside the house. She dropped her briefcase on the sofa in the living room and continued to the hall closet, where she shed her overcoat. "You're home early," I said again.

"That's right. Surprised?" She draped her overcoat across a hanger.

"Well. . . ." *Yes, I was.* "Did Crowe drop you off?"

She shoved the other coats aside with a hard swipe. "Yes." Then she turned and started up the stairs. I closed the closet door for her.

"How was Washington?" I asked. "Did you impress the Supremes?"

She didn't answer and I followed her up the stairs. I found her in our bedroom, shedding her travel clothes. I hung the suit bag on the closet door. "Did you hear me? I asked how—"

"I heard you." She dropped her skirt to the floor and sent it in the direction of the hamper with a flick of her foot. "Walther offered me a partnership."

"Did he?" I retrieved her skirt and put it in the hamper. "That's great news!" It was. Partners made a bundle. They took a cut of the fees the associates charged. "It opens up all sorts of opportunities."

Brenda gave me a funny look. "Yes," she said. "It does." If I hadn't known better, I would have said she looked distressed. It was hard to imagine Brenda being unsure.

"What's wrong?" I said.

"Nothing. It's just that there are conditions attached."

"What conditions? A probationary period? You've been an associate there for seven years. They should know your work by now."

"It isn't that."

"Then, what—"

Deirdre interrupted us. She stood in the doorway of our bedroom, one foot crossed pigeontoed over the other, a gnarled finger tucked in one shrunken check. "Mommy?"

Brenda looked at a point on the door jamb a quarter inch above Dee-dee's head. "What is it, honey?"

"I should tell you 'welcome home' and 'I missed you.' "

I could almost hear *Connie said* . . . in front of that statement and I wondered if Brenda could hear it, too.

"I missed you, too, honey," Brenda told the door knob.

"I've got to take my bath, now."

"Good. Be sure to get all that dirt washed off."

"OK, Mommy." A brief catch, and then, "I love you, Mommy."

Brenda nodded. "Yes."

Dee-dee waited a moment longer, then turned and bolted for the bathroom. I could hear Connie already running the water. I waited until the bathroom door closed before I turned to Brenda. "You could have told her that you loved her, too."

"I do," she said, pulling on a pair of slacks. "She knows I do."

"Not unless you tell her once in a while."

She flashed me an irritated look, but made no reply. She took a blouse from her closet and held it in front of her while she stood before the mir-

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ror. "Let's go out to eat tonight."

"Go out? Well, you know that Dee-dee doesn't like to leave the house, but—"

"Take Deirdre with us? Whatever are you thinking of, Paul? She would be horribly embarrassed. Think of the stares she'd get! No, Consuela can feed her that Mexican goulash she's cooking."

"Guatemalan."

"What?"

"It's Guatemalan, whatever it is."

"Do you have to argue with everything I say?"

"I thought, with you being just back and all, that the three of us—" *The four of us.* "—could eat dinner together, for a change."

"I won't expose Deirdre to the rudeness of strangers."

"No, not when she can get it at home." I don't know why I said that. It just came out.

Brenda stiffened. "What does that crack mean?"

I turned away. "Nothing."

"No, tell me!"

I turned back and faced her. "All right. You treat Dee-dee like a non-person. She's sick, Brenda, and it's not contagious and it's not her fault."

"Then whose fault is it?"

"That's lawyer talk. It's no one's fault. It just happens. We've been over that and over that. There is no treatment for progeria."

"And, oh, how it gnaws at you! *You can't cure her!*"

"No one can!"

"But especially you."

No one could cure Dee-dee. I knew that. It was helplessness, not failure. I had accepted that long ago. "And *you're* angry and bitter," I replied, "because there's nobody you can sue!"

She flung her blouse aside and it landed in a wad in the corner. "Maybe," she said through clenched teeth, "Maybe I'll take that partnership offer, after all."

It was not until much later that evening, as I lay awake in bed, Brenda a thousand miles away on the other side, that I remembered Consuela's remark. *It's not right for a little girl to grow up without a mother.* I wondered. Had she been making a comment, or making an offer?

I don't want to play in your yard
I don't like you any more.
You'll be sorry when you see me
Sliding down our cellar door.

The next time I saw Mae Holloway, we quarreled.

Perhaps it was her own constant sourness coming to the fore, or perhaps it was her fear of insanity returning. But it may have been a bad humor that I carried with me from Brenda's homecoming. We had smoothed things out, Brenda and I, but it was a fragile repair, the cracks plastered over with I-was-tired and I-didn't-mean-it, and we both feared to press too hard, lest it buckle on us. At dinner, she had told me about the case she had helped argue, and I told her about Mae Holloway and we both pretended to care. But it was all monologue. Listening holds fewer risks than response; and an attentive

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smile, less peril than engagement.

Mae wouldn't look at me when I greeted her. She stared resolutely at the floor, at the medicine cabinet, out the window. Sometimes, she stared into another world. I noticed how she gnawed on her lips.

"We have a couple of days to catch up on, Mrs. Holloway," I said. "I hope you've been making notes, like I asked."

She shook her head slowly, but in a distracted way. She was not responding to my statement, but to some inner reality. "I just keep remembering, doc. There's music all the time, and that double vision—"

"Consciousness doubling."

"It's like I'm in two places at once. Sometimes, I forget which is which and I try to step around things only I cain't, because they're only ghosts, only ghosts. And sometimes, I recollect things that couldn't have. . . ."

The "dreamy states" of Jackson patients often grow deeper and more frequent. In one woman, they had occupied nearly her entire day; and, in the end, they had crowded out her normal consciousness entirely. "I could prescribe something, if you like," I said. "These spells of yours are similar to epileptic seizures. So, there are drugs that—"

She shook her head again. "No. I won't take drugs." She looked directly at me at last. "Don't you understand? I've got to know. It's always been bits and pieces. Just flashes. A jimble-jamble that never made sense. Now. . . ." She paused and took a deep breath. "Now, at least, I'll know."

"Know what, Mrs. Holloway?"

"About . . . everything." She looked away again. Talking with her today was like pulling teeth.

"What about the songs, Mae? We didn't get anything useful on Wednesday and I wasn't here Tuesday or yesterday, so that's three days we have to catch up on."

Mae turned and studied me with lips as thin as broth. "You don't care about any of this, do you? It's all professional; not like you and I are friends. You don't care if'n I live or die; and I don't care if'n you do."

"Mrs. Holloway, I—"

"Good." She gave a sharp nod of her head. "That's jake with me. Because I don't like having friends," she said. "I decided a long time ago if'n I don't have 'em, I won't miss 'em when they cut out. So let's just keep this doc and old lady." Her stare was half admonition, half challenge, as if she dared me to leap the barriers she had set down around her.

I shrugged. Keep things professional. That was fine with me, too. A crabby old lady like her, it was no wonder they all ran out on her.

She handed over a crumpled, yellow sheet of lined paper, which I flattened out on my desk. She had written in a soft pencil, so I smeared some of the writing and smudged my palm. I set a stack of fresh index cards by and began to copy the song titles for later research. "Where Did You Get That Hat?" "Comrades." "The Fountain in the Park." "Love's Old Sweet Song." While I worked, I could hear Mae humming to herself. I knew without looking that she had her eyes closed, that she was living more and

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more in another world, gradually leaving this one behind. "White Wings." "Walking for That Cake." "My Grandfather's Clock." "In the Gloaming." "Silver Threads Among the Gold." "The Mulligan Guard." Mae was her own Hit Parade. Though if the music did play continually, as she said, this list could only be a sample of what she had heard over the last three days. "The Man on the Flying Trapeze." "Sweet Genevieve." "Champagne Charlie." "You Naughty, Naughty Men." "When You and I were Young, Maggie." "Beautiful Dreamer." Three days' worth of unclaimed memories.

I noticed that she had recorded no doubling episodes, this time. Because she had not had any? It seemed doubtful, considering. But one entry had been crossed out; rubbed over with the pencil until there was nothing but a black smear and a small hole in the paper where the pencil point had worn through. I held it up to the light, but could make out nothing.

I heard Mae draw in her breath and looked up in time to see a mien on her face, almost of ecstasy. "What is it?"

"I'm standing out in a meadow. There's a sparkling stream meandering through it, and great, grey, rocky mountains rearing all around. Yellow flowers shivering in the breeze and I think how awful purty and peaceful it is." She sighed. "Oh, doc, sometimes, just for a second, we can be so happy."

Jackson had often described his patients' "dreamy states" as being accompanied by intense feelings of euphoria; sudden bursts of childlike joy. No doubt some endorphin released in the brain.

"There's a fellow coming up toward me from the ranch," she continued, trepidation edging into her voice. "My age, maybe a little older. Might be Mister's younger brother, because he favors him some. He's a-weeping something awful. I reach out to him and he puts his head on my shoulder and says. . . ." Mae stopped and winced in pain. She sucked in her breath and held it. Then she let it out slowly. "And he says how Sweet Annie is dead and the baby, too; and there was nothing the sawbones could do. Nothing at all. And I think, *Thank you, Goodman Lord. Thank you, that she won't suffer the way that Ma did.* And then a mockingbird takes wing from the aspen tree right in front of me and I think how awful peaceful the meadow is now that the screaming has stopped."

She wiped at her nose with her sleeve. "Listen to it. Can you hear it, doc? There ain't a sound but for the breeze and that old mockingbird." The look on her face changed somehow, changed subtly. "Listen to the mockingbird," she croaked. "Listen to the mockingbird. Oh, the mockingbird still singing o'er her grave. . . ."

Then she looked about in sudden surprise. "Land's sake! Now, how did I get here? Why, everybody's so happy; singing the mockingbird song and dancing all over the lawn and a-hugging each other." A smile slowly came over her face. She had apparently tripped from one doubling episode directly into another, due to some as-

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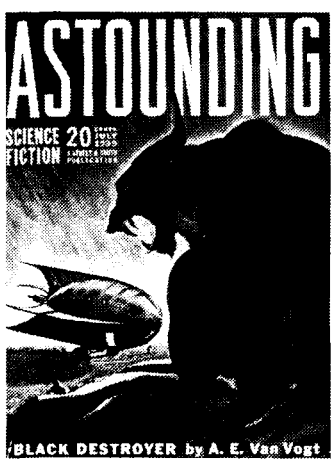

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sociation with the song, and the imprinted emotions were playing back with it, overwriting the melancholy of the first episode. Or else she had seized on the remembered joy herself, and had wrapped herself in it against the cold.

"I'm a-wearing my Sanitary Commission uniform," she went on, preening her shabby, faded gown. She shot her cuffs, straightened something at her throat that wasn't there. "I was a nurse, you know; and when the news come that the war was finally over we all heighed over to the White House and had ourselves a party on the lawn, the whole kit 'n boodle of us. Then the President hisself come out and joined us." She turned in her seat and pointed toward the medicine cabinet. "Here he comes now!"

And in that instant, her joy became absolute terror. "Him?" Her smile stretched to a ghastly rictus and she cowered into her chair, covering her eyes with her hand. But you can't close your eyes to memory. You can't. "No! I kin still see him!" she said.

What was so terrifying about seeing President Wilson close up? "What's wrong, Mrs. Holloway?"

"They shot him."

"What, on the White House lawn? No president has been shot there." And certainly not Wilson.

She took her hands away from her eyes, glanced warily left, then right. Slowly, she relaxed, though her hands continued to tremble. Then, she looked at me. "No, the shooting happened later," she snapped, anger blossoming from her fear. Then she closed up and her eyes took on a haunted look. "I'm taking up too much of your time, doc," she said, creaking to her feet.

"No, you're not. Really," I told her.

"Then you're taking up too much of mine." I thought her blackthorn stick would punch holes in the floor tiles as she left.

After a moment's hesitation, I followed. She had recalled her father's death. She had remembered that her birth had killed her mother and that her father had blamed her for it. She had remembered her husband going off to war, never to return. Sad memories, sorrowful memories; but there was something about this new recollection that terrified her.

She thought she was going crazy.

It was easy to track her through the garden. Deep holes punched into the sod marked her trail among the flower beds. When I caught up with her, she was leaning over a plot of gold and crimson marigolds. "You know, I remember exactly where I was when President Kennedy was shot," I said by way of easing her into conversation.

Mae Holloway scowled and bent over the flower bed. "Don't make no difference no-how," she said. "He's dead either way, ain't he?" She turned her back on me.

"No particular reason." I had figured it out. She had seen McKinley, not Wilson; and her husband had fought in the Spanish-American War, not World War I.

She turned her dried-out face to me. "Think I'm getting senile, doc?

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Why aren't you back in your office reading on your books? You might have a patient to ignore."

"They'll find me if they need me."

"I tol' you the songs I been remembering. Why did you follow me out here, anyway?"

I had better things to do than have a bitter old woman berate me. "If you feel in a friendlier mood later," I said, "you know where to find me."

Back in my office, I began checking the latest tunes against the song encyclopedia. The mindless transcription kept me busy, so that I did not dwell on Mae's intransigence. Let her stew in her own sour juices.

But I soon noticed a disturbing trend in the data. "Champagne Charlie" was written in 1868. "You Naughty, Naughty Men" ("When married how you treat us and of each fond hope defeat us, and there's some will even beat us. . . .") had created a scandal at Niblo's Gardens in 1866. And "Beautiful Dreamer" dated from *1864*. Mae could not have heard those songs when they were new. Born in the early seventies at best, tucked away back in the hills of Tennessee—"So far back in the hollers," she had said one time, "that they had to pipe in the daylight."—She must have heard them later.

And if a little bit later, why not a whole lot later?

And there went the whole rationale for my book.

The problem with assigning dates to Mae's neurological hootenanny was that she could have heard the songs at any time. A melody written in the twenties, like "The Red, Red Robin," is heard and sung by millions of children today. Scott Joplin created his piano rags at the turn of the century; yet most people knew them from *The Sting*, a movie made in the seventies and set in the thirties, an era when ragtime had been long out of fashion.

(The telescoping effect of distance. From this far down the river of years, who can distinguish the Mauve Decade from the Thirties? Henry James and Upton Sinclair and Ernest Hemingway came of age in very different worlds; but they seem alike to us because they are just dead people in funny clothing, singing quaint, antique songs. "Old-fashioned" is enough to blur them together.)

Face it. Many of those old songs were still being sung and recorded when *I* was young. Lawrence Welk. Mitch Miller. Preservation Hall. Leon Redbone had warbled "Champagne Charlie" on the "Tonight Show" in front of God and everybody. Wasn't it far more likely that Mae had heard it then, than that she had heard it in 1868?

A Hundred-and-Twentysomething. I had deduced a remarkable age for Mae from the dates of the songs she remembered. If that was a will-o'-the wisp, what was the point? There was no teleology to interest the professionals; no hook to grab the public. How many people would care about an old woman's recollections? Not enough to make a best-seller.

And what right had that old bat, what right had anyone, to live so long when *children* were dying? What use

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were a few extra years remembering the past when there were others who would never have a future?

Damn! I saw that I had torn the index card. I rummaged in the drawer for tape, found none, and wondered if it made any sense to bother recopying the information. The whole effort was a waste of time. I picked up the deck of index cards and threw them. I missed the wastebasket and they fluttered like dead leaves across the room.

Oh, how old is she, Billy Boy, Billy Boy?
Oh, how old is she, charming Billy?
She's twice six and she's twice seven,
Forty-eight and eleven.
She's a young thing that cannot leave her mother.

I could have gone home, instead, and gotten an early start on the weekend.

I had planned to visit the National Archives today, but to continue the book project now seemed pointless. The whole rationale had collapsed; and Mae had withdrawn into that fearful isolation in which I had found her. Brenda had taken the day off to recuperate from her trip. She was probably waiting for me. There was no reason not to go home.

But, I closed the clinic at noon and took the Transit to Newark's Penn Station, where I transferred to the PATH train into the World Trade Center. From there a cab dropped me at Varick and Houston in lower Manhattan.

If we did not meet, we could not quarrel.

* * *

The young woman behind the information desk was a pixie: short, with serious bangs and serious, round glasses. Her name tag read SARA. "Green?" she said when I had explained my mission. "What an odd name. It might be a nickname. You know, like 'Red.' One of my grandfathers was called 'Blackie' because his family name was White." She took out a sheet of scratch paper and made some notes on it. "I'd suggest you start with the 1910 Census and look for Green Holloway in the Soundex."

"Soundex?" I said. "What is that?"

"It's like an Index, but it's based on sounds, not spelling. Which is good, since the enumerators didn't always spell the names right. Holloway might have been recorded as, oh, H-a-l-i-w-a-y, for example, or even H-a-l-l-a-w-a-y; but the Soundex code would be the same."

"I see. Clever."

She took out a brochure and jotted another note on the scratch pad. "Holloway would be . . . H. Then L is a 4, and the W and Y don't count. That's H400. There will be a lot of other names listed under H400, like Holly and Hall, but that should narrow your search." She filled out a request voucher for me. "Even with the Soundex," she said as she wrote, "there are no guarantees. There are all sorts of omissions, duplicates, wrong names, wrong ages. Dad missed his great-grandmother in the 1900 Census, because she was living with her son-in-law and the enumerator had listed her with the son-in-law's family name. One of my great-

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great-grandfathers 'aged' fourteen years between the 1870 and 1880 censuses; and his wife-to-be was listed twice in 1860. People weren't always home; so, the enumerator would try to get the information from a neighbor, who didn't always know. So you should always cross-check your information."

She directed me to an empty carrel, and shortly after, an older man delivered the 1910 Soundex for Blount County, Tennessee. I threaded the microfilm spool into the viewer and spun forward, looking for H400. Each frame was an index card with the head of household on top and everyone else listed below with their ages and relationships.

I slowed when I started to see first names starting with G: Gary ... George ... Gerhard ... Glenn ... Granville ... Gretchen ... Gus ... No Green. I backed up and checked each of the G's, one by one, thinking Green might be out of sequence.

Still, no luck. And I couldn't think of any other way "Green" might be spelled. Unless it was a nickname, in which case, forget it. I scrolled ahead to the M's. If the census taker had interviewed Mae, Green might be listed as "Mister."

But.... No "Mister." Then I checked the M's again, this time searching for "Mae" or "May," because if Mister had died in the Spanish-American War rather than World War I, Mae herself would have been listed as head of household in 1910.

Still nothing. It was a fool's errand, anyway. For all I knew, Mae was really Anna-Mae or Lulu-Mae or some other such Appalachianism, which would make finding her close to impossible.

I tried the 1900 Soundex next. But I came up dry on that, too. No Green, no Mister, no Mae. Eventually, I gave up.

I leaned back in the chair and stretched my arms over my head. Now what? *We lived so far back in the hollers they had to pipe in the daylight.* It could be that the census takers had flat out missed her. Or she had already left the hills by 1900. In which case, I did not know where to search. She had gone to Cincinnati, I remembered. And to California. At one time or another, she had mentioned San Francisco, and Chicago, and Wyoming, and even New York City. The old bag had a lot of travel stickers on her.

I took a walk to stretch my legs. If I left now, and the trains were on time, and the traffic was light, I could still be home in time to tuck Deedee in. But a check of the sidewalk outside the building showed the crowds running thick. The Financial District was getting an early start on the weekend. Not a good time to be leaving the City. Not a good time at all. Traffic heading for the tunnels sat at a standstill. Tightly-packed herds of humans trampled the sidewalks. I would have likened them to sheep, but for the in-your-face single-mindedness with which they marched toward their parking lots and subway entrances.

The trains would be SRO, packed in with tired, sweaty office workers chattering about Fashion Statements

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or Sunday's Big Game; or (the occasional Type A personality) hunched over their laptops, working feverishly on their next deal or their next angina, whichever came first.

Was there ever a time when the New York crowds thinned out? Perhaps there was a continual stream of drones flowing through the streets of Manhattan twenty-four hours a day. Or maybe they were simply walking around and around this one block just to fool me. A Potemkin Crowd.

I returned to the information desk. "I guess as long as I'm stuck here I'll check 1890." That would be before the Spanish-American War, so Green might be alive and listed.

"I'm sorry," Sara told me. "The 1890 Census was destroyed in a fire in 1921, and only a few fragments survived.

I sighed. "Dead end, I guess. I'm sorry I took up so much of your time."

"That's what I'm here for. You could try 1880, though, and look for parents. There's a partial Soundex for households with children aged ten and under. If the woman was born in the 1870s like you think. . . ."

I shook my head. "No. I know she was born a Murray, but I don't know her father's name." Checking each and every M600 for a young child named Mae was not an appealing task. I might only be killing time; but I had no intention of bludgeoning it to death. I'd have a better chance hunting Holloways, because Green's name was so out of the ordinary. But I'd have to go frame-by-frame there, too, since I didn't know his parents' names, either. That sort of painstaking research was the reason why God invented professionals.

Sara pointed to a row of shelves near the carrels. "There is one other option. There are printed indices of Heads of Households for 1870 and earlier."

I shook my head. "The grandparents? I don't know their names, either."

"Did she have a brother?"

"Zach," I said. "Just the two of them, as far as I know. At least, she's never mentioned any other siblings."

"Children sometimes were given their grandparents' names. Maybe her father's parents were Zach and Mae Murray. It's a shot in the dark, but what do you have to lose? If you don't look, you'll never find anything."

"OK, thanks." I wandered over to the row of index volumes and studied them. I was blowing off the time now and I knew it. Still, I could always strike it lucky.

The indices for Tennessee ran from 1820 through 1860. Thick, bound volumes on heavy paper. No Soundex here. I'd have to remember to check alternate spellings. I pulled out the volume for 1860 and flipped through the pages until I found Murray. Murrays were "thick as ticks on a hound dog's hide," but none of them were

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named Zach. However, when I checked H, I did find a "Green Holloway" in District 2, Greenback, Tennessee. Mister's grandfather? How many Green Holloways could there be? I copied the information and put in a request for the spool; then, just for luck, I checked 1850, as well.

The 1850 Census listed a "Greenberry Hollaway," also in District 2, Greenback P.O. I chuckled. Greenberry? Imagine sending a kid to school with a name like Greenberry!

Green appeared in the 1840 and 1830 indexes, too. And 1830 listed a "Josh Murry" in the same census district as Green. Mae's great-grandfather? Worth a look, anyway.

The trail ended there. The Blount County returns for 1820 were lost, and all the earlier censuses had been destroyed when the British burned Washington in 1814.

I put the volumes back on the shelf. There was a thick atlas on a reading stand next to the indices and, out of curiosity, I turned it open to Tennessee. It took me a while to find Greenback. When I finally did, I saw that it lay in Loudon County, not Blount.

"That doesn't make any sense," I muttered.

"What doesn't?" A shriveled, dried up old man with wire frame glasses was standing by my elbow waiting to use the atlas.

"The indices all say Blount County, but the town is in Loudon." I didn't bother to explain. It wasn't any of his business. There could be any number of reasons for the discrepancy. The Greenback post office could have serviced parts of Blount County.

The man adjusted his glasses and peered at the map. I stepped aside. "It's all yours," I said.

"Now, hold on, sonny." He opened his satchel, something halfway between a purse and a briefcase, and pulled out a dog-eared, soft-bound red book. He licked his forefinger and rubbed pages aside. He hummed and nodded as he read. "Here's your answer," he said, jabbing a finger at a table. "Loudon County was erected in 1870 from parts of Blount and neighboring counties. Greenback was in the part that became Loudon County. See?" He closed the book one-handed with a snap. "It's simple."

I guess if hanging around musty old records is your whole life, it's easy to sound like an expert. He looked like something the Archives would have in storage anyway. "Thanks," I said.

The whole afternoon had been a waste of time. I had been searching in the wrong county. Blast the forgetfulness of age! Mae had said she had been born in Blount County, so I had looked in Blount County. And all the while, the records were tucked safely away under Loudon.

I checked the clock on the wall. Four-thirty? Too late to start over. Time to pack it in and catch the train.

When I returned to my carrel, however, I found the spool for 1860 Blount County had already been delivered. I considered sending it back, but decided to give it a fast read before leaving. I mounted the spool and spun the fast forward, slowing when I reached District 2. About a third of the way through, I stopped.

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Names	Age	Sex	Color	Occupation, etc.	Value of real estate	Value of personal property	Birthplace
Holloway, Green	*56*	*M*	*W*	*Farmer*	*$800*	*$100*	*Tenn*
" Mabel	*37*	*F*	*"*				*"*
" Zachary	*22*	*M*	*"*				*"*

Hah! There it was. Success—of sorts—at last! This Green Holloway must have been the same one whose Civil War records I had gotten. Green and Mabel Holloway begat Zach Holloway, who must have begat Green "Mister" Holloway. Jesus. If those ages were correct, Mabel was only fifteen when she did her begatting. Who said babies having babies was a modern thing? But, kids grew up faster back then. They took on a lot of adult responsibilities at fifteen or sixteen. Today, they behave like juveniles into their late twenties.

Now that I knew what I was looking for and where it was, it didn't take me very long to check the 1850 Census, as well.

Names	Age	Sex	Color	Occupation, etc.	Value of real estate	Birthplace
Holloway, Greenberry	*45*	*M*	*W*	*Farmer*	*$250*	*Tenn*
" Mae	*32*	*F*	*"*			*"*
" Zachy	*12*	*M*	*"*			*"*

Those names . . . the eerie coincidence gave me a queer feeling. And Mabel should have been twenty-seven, not thirty-two. (Or else she should have been forty-two in 1860.) But then I remembered Sara's cautions. How easy it was for enumerators to get names and ages wrong; and how the same names were used generation after generation.

Just one more spool, I promised myself. Then I head home.

Names of heads of families	Free white persons, including heads of families																								
	Males													Females											
	To 5	5-10	10-15	15-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100		To 5	5-10	10-15	15-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Greeny Holloway	1					1												1							

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Uncle Sugar had been less nosy in 1840. The Census listed only heads of households. Everyone else was tallied by age bracket.

The "white female" was surely Mabel, and she was in her twenties. So her age in 1860 had been wrong. She must have been forty-two, not thirty-seven. Twenty-two, thirty-two, forty-two. That made sense. I folded the sheet with the information and stuffed it in my briefcase. Sara had been right about cross-checking the documentation. The census takers had not always gotten the straight skinny. Mabel had probably looked younger than her years in 1860 and a neighbor, asked for the data, had guessed low.

"She looks younger than her years." The phrase wriggled through my mind and I thought fleetingly of Dee-dee looking older than her years. For every yin there is a yang, and if the Universe did balance . . . if for some reason Mabel herself never spoke to the enumerator and a neighbor in the next holler guessed her age instead, the guess would be low. So, twenty-seven, thirty-two, thirty-seven made a weird kind of sense, too. And it actually agreed better with the written documents!

And what if she kept it up! I laughed to myself. Now there was a crazy thought! Aging five years to the decade, by 1870 she would have seemed . . . mmm, forty-two. And today? Add another sixty-odd years, and Mabel would appear to be. . . . A hundred and five or thereabouts. About as old as Mae seemed to be.

I paused with one arm in my jacket. About as old as Mae seemed to be? I stared at the spool boxes stacked in the carrel, ready for pick-up.

Greenberry and Mabel. Green and Mae? No, it was absurd. A wild coincidence of names. *The census records are not that reliable. And it's only that Dee-dee is aging too fast that you even* thought *about someone aging too slow.* I took a few steps toward the door.

And the 1830 Census? I hadn't bothered checking it. What if it listed a Green Holloway aged twenty to twenty-nine and a "white female" *still* aged twenty to twenty-nine?

I turned and looked back at the reading room and my heart began to pound in my ears, and all of a sudden I knew why Dr. Bench had figured Mae for eighty-five three decades ago, and why Mae had feared for her sanity all her life.

So early in the month of May,
As the green buds were a-swelling.
A young man on his death-bed lay,
For the love of Barbry Ellen.

It was pitch-black out when I finally arrived home. There was a light on in the kitchen, none above stairs. I parked in the driveway and got out and walked around the end of the garage through the gate into the back yard. The crickets were chirruping like a swing with a squeaky hinge. Lightning bugs drifted lazily through the air. I walked all the way to the back of the yard, to the edge of the woods and leaned against a bent gum tree. The ground around me was littered with last year's prickly balls. I

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listened to the night sounds.

I had checked 1830 and found . . . I didn't know what I found. Nothing. Everything. A few tantalizing hints. Greenberry, Mabel and Zachary. Mister, Mae and . . . Zach? Not a younger brother, but a son? And another entry: *Wm. Biddle, Jr., a free man of color.* Mae had spoken of "Will Biddle who farmed two hollers over from us when I was a child. . . ." But in 1830? In *1830?*

There was a logical part of my mind that rejected those hints. Each had an alternative explanation. Coincidence of names. Clerical errors. Senile memory.

Sometimes we remember things only because we have been told them so often. *I remember that I stepped* in a birthday cake when I was two years old. It had been placed on the floor in the back of the family car and I had climbed over the seat and. . . . But do I *remember* it? Or do I remember my parents telling me the story—and showing me the snapshot—so many times over the years that it has become real to me. Mae could be remembering family tales she had heard, tales scrambled and made *hers* by a slowly short-circuiting brain.

But there was another part of me that embraced those hints; that wanted to believe that Mae had known Margaret Sanger, had voted for Teddy Roosevelt, had danced on the White House lawn in a Sanitary Commission uniform, because if they were true. . . .

I stepped away from the tree and a rabbit shot suddenly left to right in front of me. I watched it bound away. . . . And spied figures moving about in the Carters's backyard. Henry and Barbara. I watched them for a while, wondering idly what they were up to. Then I recalled Henry's nickname for his wife—and a song that Mae had known.

I took the same route the rabbit had taken. Last year's dead leaves crackled and dry twigs snapped beneath my feet. I saw one of the Carters—Henry, I thought—come suddenly erect and look my way. I hoped he wouldn't call the police. Then I thought, Christ, they're newlyweds. What sort of backyard shenanigans was I about to walk in on?

I stopped and waved a hand. "That you, Henry? Barbara? It's Paul Wilkes."

A second shadow stood erect by the first. "What's wrong?" It was Barbara's voice.

"I—I saw you moving around back there and thought it might be prowlers. Is everything all right?"

"Sure," said Henry. "Come on out. You'll get tick-bitten if you stay in there."

"Why don't you have your yard light on?" I asked as I stepped from the woods. Stupid question. I could think of a couple of reasons. Brenda and I had once gone skinny dipping in our pool at three in the morning. *Stifled laughter and urgent play, and the water glistening like pearls on her skin.* That had been years ago, of course; but sometimes it was good to remember that there had once been times like that.

"It would spoil the viewing,"

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Henry said.

Now that I was close enough, I saw that they had a telescope set up on a tripod. It was a big one. "Oh. Are you an astronomer?"

Henry shook his head. "I'm a genetic engineer, or I will be when I finish my dissertation. Barbry's going to be a biochemist. Astronomy is our hobby."

"I see." I felt uncomfortable, an intruder; but I had come there with a purpose. I made as if to turn away and then turned back. "Say, as long as I'm here, there is a question you might be able to answer for me."

"Sure." They were an obliging couple. The Moon was half-full, the air was spring evening cool, they did not really want me there interrupting whatever it was that the sky-gazing would have led to.

"I've heard Henry call you Barbry," I said to Barbara. "And . . . do you know a song called 'Barbry Ellen'?"

She laughed. "You mean 'Barbara Allen.' Sure. That's where Henry came up with the nickname. He's into folk singing. 'Barbry Ellen' is an older version."

"Well, someone told me it was the 'old president's favorite song,' and I wondered if you knew—"

"Which old president? That's easy. George Washington. You see, he had this secret crush on his best friend's wife, and—"

"George Washington? Are you sure?"

"Well, there might have been other presidents who liked it. But Washington's partiality is on the record, and the song has been out of vogue a long, long time."

"Was that all you wanted to know?" asked Henry. There was something in his voice that sounded a lot like "good bye." He wasn't happy, I could tell. I had spoiled the mood for him.

"Yes, certainly," I said. "I thought you might have been prowlers." I backed away into the woods, then turned and walked quickly home.

I learned me that 'un when I was knee-high to a grasshopper. Pa told me it was the President's favorite song. The old President, from when his Pappy fought in the War.

The old President, from when his Pappy fought in the War.

Lost my partner, what'll I do?
Lost my partner, what'll I do?
Lost my partner, what'll I do?
Skip to my love, my darling.

Brenda drank tea. She always allowed the bag to steep for a precise five minutes (read the package) and always squeezed it dry with her tea spoon. She always disposed of the bag in the trash before drinking from the cup. When she drank, she held the saucer in her left hand and the cup in her right and hugged her elbows close to her body. She stood near the French doors in the family room, gazing out toward the back yard and the woods beyond. I had no idea if she had heard me.

"I said, I think I'll go over to Sunny Dale today and look in on Mrs. Holloway."

Brenda held herself so still she was nearly rigid. Not because she was reacting to what I had said. She always

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stood that way. She spent her life at attention.

"You didn't have any plans, did you?"

A small, precise shake of the head. "No. No plans. We never have any plans." A sip of tea that might have been measured in minims. "Maybe I'll go into the office, too. There are always cases to work on."

I hesitated a moment longer before leaving. When I reached the front door, I heard her call.

"Paul?"

"Yes?" Down the length of the hall I could see her framed by the glass doors at the far end. She had turned around and was facing me. "What?"

"Why do you have to go in today? It's a Saturday."

"It's . . . nothing I can talk about yet. A wild notion. It might be nothing more than a senile woman's ravings, but it might be the most important discovery of the century. Brenda, if I'm right, it could change our lives."

Even from where I stood I could see the faint smile that trembled on her lips. "Yes, it could, at that." She turned around and faced the glass again. "You do what you have to do, Paul. So will I."

It was odd, but I suddenly remembered how much we had once done

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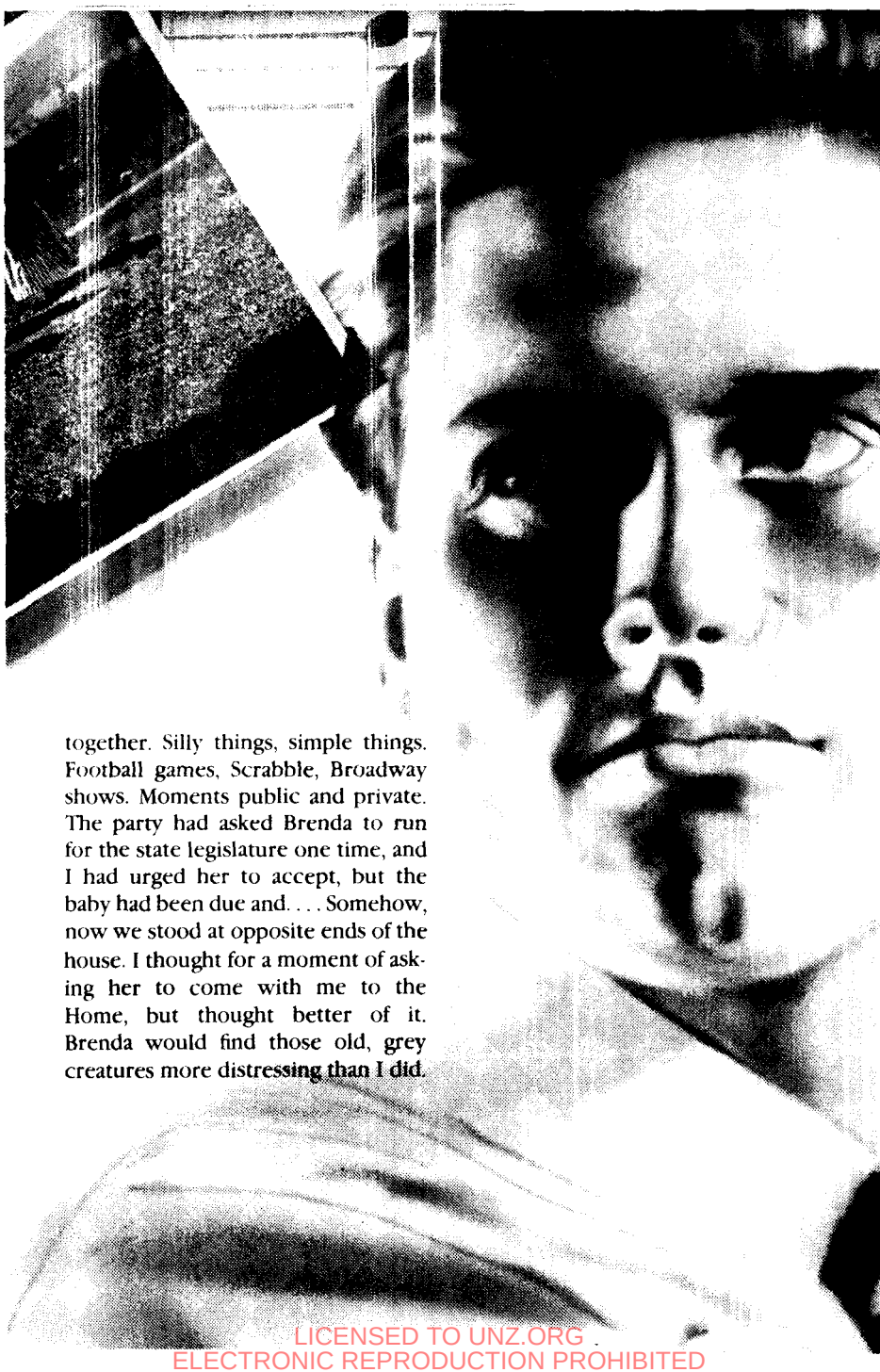

together. Silly things, simple things. Football games, Scrabble, Broadway shows. Moments public and private. The party had asked Brenda to run for the state legislature one time, and I had urged her to accept, but the baby had been due and. . . . Somehow, now we stood at opposite ends of the house. I thought for a moment of asking her to come with me to the Home, but thought better of it. Brenda would find those old, grey creatures more distressing than I did.

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"Look," I said, "this should only take a couple of hours. I'll call you and we'll do something together this afternoon. Take in a movie, maybe."

She nodded in her distracted way. I saw that she had spilled tea into her saucer.

Once at the Home, I sought out Mae in her garden retreat, hoping that she was in a better mood than yesterday. I had a thousand questions to ask her. A dozen puzzles and one hope. But when she saw me coming, her face retreated into a set of tight lines: eyes, narrowed; mouth and lips, thin and disapproving.

"Go away," said Mae Holloway.

"I only wanted to ask a few—"

"I said, go away! Why are you always pestering me?"

"Don't mind her," said a voice by my elbow. "She's been that way since yesterday." I turned and saw Jimmy Kovacs, the retired printer. "Headache. Maybe you should give her something."

"You don't need a doctor to take aspirin."

He shook his head. "Aspirin didn't work. She needs something stronger. Might be a migraine. I had an allergy once. To hot dog meat. Every time I had a frank, my head felt like fireworks going off inside. So, my doc, he tells me—"

"I'll see what I can do," I said. Old folks chatter about little else than their ailments. They compare them the way young boys compare . . . well, you know what I mean. "Mine is bigger than yours." They have contests, oldsters do, to see who has the biggest illness. The winner gets to die.

I sat on the stone bench beside Mae. "Jimmy tells me you have a headache," I said.

"Jimmy should mind his own affairs."

"Where does it hurt?"

"In my haid, jackass. That's what makes it a headache."

"No, I mean is it all over or in one spot? Is it a dull ache or sharp points. Is it continual, or does it come in bursts? Do you see or hear anything along with the headache?"

She gave me a look. "How do you make a headache into such a contraption?"

I shrugged. "There are many things that can cause a headache. When did it start?" If I could relieve her pain, she might be willing to answer the questions I had about her family history.

She squinted at the ground, her face tight as a drum. I heard her suck in her breath. Bees danced among the flowers to our right; the fragrances hung in the air. "Yesterday afternoon," she said. "Yesterday afternoon, after you left. It was like the Sun come up inside my head. I was lying down for a nap when everything turned blind-white for a few seconds and I heard a chorus a-singing hymns. I thought I'd surely died and gone to heaven." She took a deep breath and massaged her left temple with her fingers. "Somedays I'ud as lief I were dead. All these here aches and pains. And I cain't do the things I used to. I used to dance. I used to love to dance, but I can't do that no more. And everybody who ever mattered to me is a longtime gone."

Her parents. Little Zach. Green

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Holloway. Gone a very long time, if I was right. Joe Paxton. Ben Wickham. There must have been plenty of others, besides. Folks in Cincinnati, in California, in Wyoming. She left a trail of alienation behind her every place she had ever been. It was a cold trail, in more ways than one.

"When the white light faded out, I saw it weren't an angel choir, after all. It were Christy's Minstrels that time when they come to Knoxville, and Mister and me and . . . " she frowned and shook her head. "Mister and me, we tarryhooted over to hear 'em. Doc, it was the clearest spell I ever had. I was a-settin' in the audience right down in front. I clean forgot I was a-bedded down here in Sunny Dale."

Sometimes migraines triggered visions. Some of the saints had suffered migraines and seen the Kingdom of God. "Yes?" I prompted.

"Well, Mister was a-settin' on my left holding my hand; and someone's man-child, maybe fifteen year, was press't up agin me on my right—oh, we was packed in almighty tight, I tell you—but, whilst I could see and hear as clear as I can see and hear you, I couldn't feel any of them touching me. When I thunk on it, I could feel that I was lying a-bed with the sheets over me."

I nodded. "You weren't getting any tactile memories, then. I think your—"

She didn't hear me. "The troupe was setting on benches, with each row higher than the one in front—Tiers, that be what they call 'em. They all stood to sing the medley, 'cept 'Mr. Interlocutor,' who sat in a chair front and center. Heh. That was the outdoin'est chair I ever did see. Like a king's throne, it was. They sang "Jim Along Josie" and "Ring, Ring the Banjo." I h'ain't heard them tunes since who flung the chuck. The interlocutor was sided by the soloists on his right and the glee singers—what they later called barbershop singers—on the left." She gestured, moving both hands out from the center. "Then the banjo player and the dancer. Then there was four end-men, two t' either side. Those days, only the end-men were in the Ethiopian business."

"The Ethiopian business?"

"You know. Done up in blackface."

Images of Cantor singing "Mammy." Exaggerated lips; big, white, buggy eyes. An obscene caricature. "Black face!"

My disapproval must have shown in my voice, for Mae grew defensive. "Well, that was the only way us reg'lar folks ever got to hear nigra music back then," she said, rubbing her temple. "The swells could hear 'em any time; but the onlyest nigras I ever saw 'fore I left the hills was Willie Biddle and his kin, and they didn't do a whole lot of singing and dancing."

"Nigras?" That was worse than

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black-face. I tried to remind myself that Mae had grown up in a very different world.

Mae seemed to refocus. Her eyes lost the dreamy look. "What did I say? Nigra? Tarnation, that isn't right, any more, is it? They say 'coloreds' now."

"African-American. Or black."

She shook her head, then winced and rubbed her temple again. "They weren't mocking the col— the black folks. The minstrels weren't. Not then. It was fine music. Toe-tapping. And the banjo. Why, white folks took that up from the coloreds. But we'uns couldn't go to dark-town shows, and they couldn't come to us—not in them days. So, sometimes white folks dressed up to play black music. Daddy Rice, he was supposed to be the best, though I never did see him strut "Jim Crow"; but James Bland, that wrote a lot of the tunes, was a black man his own self. I heard he went off to France later 'cause of the way the white folks was always greenin' him."

"I see. Has your headache subsided since then?" *Minstrel shows*, I thought.

"It's all so mixed up. These memories I keep getting. It's like a kalideyscope I had as a young-un. All those pretty beads and mirrors. . . ."

"Your headache, Mrs. Holloway. I asked if it was still the same." Try to keep old folks on the track. Go ahead, try it.

She grimaced. "Why, it comes and goes, like ocean waves. I seen the ocean once. Out in Californey. Now, that was a trek, let me tell you. Folks was poor on account of the depression, so I took shank's mare a long part of the way, just like Sweet Betsy." She sighed. "That was always a favorite of mine. Every time I heared it, it was like I could see it all in my mind. The singing around the campfire; the cold nights on the prairie. The Injuns a-whooping and a-charging." She began to sing.

"*The Injuns come down in a great yelling horde.*
And Betsy got skeered they would scalp her adored.
So behind the front wagon wheel Betsy did crawl.
And she fought off the Injuns with powder and ball."

Mae tried to smile, but it was a weak and pained one. "I went back to Californey years later. I taken the *Denver Zephyr*, oh, my, in the 1920s I think it was. Packed into one of them old coach cars, cheek by jowl, the air so thick with cigar smoke. And when you opened the window, why you got coal ash in your face from the locomotive."

"Look, why don't you come to the clinic with me and I'll see if I have anything for that headache of yours."

She nodded and rose from her bench, leaning on her stick. She took one step and looked puzzled. Then she staggered a little. "Dizzy," she muttered. Then she toppled forward over her stick and fell to the ground. I leapt to my feet and grabbed her by the shoulders, breaking her fall.

"Hey!" I said. "Careful! You'll break something."

Her eyes rolled back up into her head and her limbs began to jerk uncontrollably. I looked over my shoul-

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der and saw Jimmy Kovacs hurrying up the garden path. "Quick," I said. "Call an ambulance! Call Dr. Khan! Tell her to meet us at the hospital."

Jimmy hesitated. He looked at Mae, then at me. "What's wrong?" he said.

"Hurry! I think she's having another stroke."

Jimmy rushed off and I turned back to Mae. Check-out time, I thought. Buy why now? Why now?

I have always loved hospitals. They are factories of health, mass producers of treatments. The broken and defective bodies come in, skilled craftsmen go to work—specialists from many departments, gathered together in one location—and healthy and restored bodies emerge. Usually. No process is 100 percent efficient. Some breakdowns cannot be repaired. But it is more efficient to have the patients come to the doctor than to have the doctor waste time traveling from house to house. Only when health is mass produced can it be afforded by the masses.

Yet, I can see how some people would dislike them. The line is a thin one between the efficient and the impersonal.

Khan and I found Mae installed in the critical care unit. The ward was shaped like a cul-de-sac, with the rooms arranged in a circle around the nurses' station. White sheets, antiseptic smell. Tubes inserted wherever they might prove useful. Professionally compassionate nurses. Bill Wing was waiting for us there. With clipboard in hand and stethoscope dangling from his neck, he looked like an archetype for The Doctor. We shook hands and I introduced him to Khan. Wing led us out into the corridor, away from the patient. Mae was in a coma, but it was bad form to discuss her case in front of her, as if she were not there.

"It was not a stroke," he told us, "but a tumor. An astrocytoma encroaching on the left temporal lobe. It is malignant and deeply invasive." Wing spoke with an odd Chinese-British accent. He was from Guangdong by way of Hong Kong.

I heard Khan suck in her breath. "Can it be removed?" she asked.

Wing shook his head. "On a young and healthy patient, maybe; though I would hesitate to perform the operation even then. On a woman this old and weak. . . ." He shook his head again. "I have performed a decompression to relieve some of the pressure, but the tumor itself is not removable."

Khan sighed. "So sad. But she has had a long life."

"How much longer does she have?" I asked.

Wing pursed his lips and looked inscrutable. "That is hard to say. Aside from the tumor, she is in good health—for a woman her age, of course. It could be tomorrow; it could be six months. She has a time bomb in her head, and no one knows how long the fuse is. We only know that the fuse—"

"Has been lit," finished Khan. Wing looked unhappy, but nodded.

"As the tumor progresses," he continued, "her seizures will become more frequent. I suspect there will

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be pain as the swelling increases." He paused and lowered his head slightly, an Oriental gesture.

"There must be something you can do," I said. Khan looked at me.

"Sometimes," she said, "there is nothing that can be done."

I shook my head. "I can't accept that." Holloway could not die. Not yet. Not now. I thought of all those secrets now sealed in her head. They might be fantasies, wild conclusions that I had read into partial data; but I had to know. I had to know.

"There is an end to everything." Noor Khan gazed toward the double doors that led to the medical CCU. "Though it is always hard to see the lights go out."

I drew my coat on. "I'm going to go to the University library for a while."

Khan gave me a peculiar look. "The library?" She shrugged. "I will stay by her side. You know how she feels about hospitals. She will be frightened when she recovers consciousness. Best if someone she knows is with her."

I nodded. "She may not regain consciousness for some time," I reminded her. "What about your patients?"

"Dr. Mendelson will handle my appointments tomorrow. I called him before I came over."

All right, let her play the martyr! I tugged my cap onto my head. Khan didn't expect thanks, did she? I could just picture the old crone's ravings. The hysteria. She would blame Khan, not thank her, for bringing her here.

As I reached the door, I heard Khan gasp. "She's singing!"

I turned. "What?"

Khan was hovering over the bed. She flapped an arm. "Come. Listen to this."

As if I had not listened to enough of her ditties. I walked to the bedside and leaned over. The words came soft and slurred, with pauses in between as she sucked in breath: "There was an old woman . . . at the foot of the hill. . . . If she ain't moved away . . . she's living there still. . . . Hey-diddle . . . day-diddle . . . de-dum. . . ." Her voice died away into silence. Khan looked at me.

"What was that all about?"

I shook my head. "Another random memory," I said. "The tumor is busy, even if she is not."

It was not until mid-afternoon, buried deep in the stacks at the University library, that I remembered my promise to call Brenda. But when I phoned from the lobby, Consuela told me that she had gone out and that I was not to wait up for her.

But the summer faded, and a chilly blast
O'er that happy cottage swept at last;
When the autumn song birds woke the dewy morn,
Our little "Prairie Flow'r" was gone.

In the year before Deirdre was born, Brenda and I took a vacation trip to Boston and Brenda laid out an hour-by-hour itinerary, listing each and every site we planned to visit. Along the way, she kept detailed logs of gas, mileage, arrival and departure times at each attraction, expenses, even tips

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to bellboys. It did not stop her from enjoying Boston. She did not insist that we march in lockstep to the schedule. "It's a guide, not a straitjacket," she had said. Yet, she spent an hour before bed each night updating and revising the next day's itinerary. Like an itch demanding a scratch, like a sweet tooth longing for chocolate, satisfying the urge to organize gave her some deep, almost sensual pleasure.

Now, of course, everything was planned and scheduled, even small trips. Sometimes the plan meant more than the journey.

Brenda frowned as I pulled into the secluded lot and parked in front of an old, yellow, wood-frame building. A thick row of fir trees screened the office building from the busy street and reduced the sound of rushing traffic to a whisper.

"Paul, why are we stopping? What is this place?"

"A lab," I told her. "That phone call just before we left the house. Some work I gave them is ready."

"Can't you pick it up tomorrow when you're on duty?" she said. "We'll be late."

"We won't be late. The Sawyers never start on time, and there'll be three other couples to keep them busy."

"I hope that boy of theirs isn't there. He gives me the creeps, the way he stares at people."

"Maybe they changed his medication," I said. "Do you want to come in, or will you wait out here?"

"Is there a waiting area?"

"I don't know. I've never been here before."

Brenda gave a small sound, halfway between a cough and a sigh. Then she made a great show of unbuckling her seat belt.

"You don't have to come in if you don't want to," I said.

"Can you just get this over with?"

Inside the front door was a small lobby floored with dark brown tiles. The directory on the wall listed three tenants in white plastic, push-pin letters: a management consulting firm, a marriage counselor, and the genetics lab.

When Brenda learned that S/P Microbiology, was situated on the third floor, she rolled her eyes and decided to wait in the lobby. "Don't be long," she said, her voice halfway between an order, a warning and a plaintive plea to keep the schedule.

The receptionist at S/P was a young redhead wearing a headset and throat mike. He showed me to a chair in a small waiting room, gave me a not-too-old magazine to read, and spoke a few words into his mouthpiece. When the telephone rang, he touched his earpiece once and answered the phone while on his way back to his station. Clever, I thought, to have a receptionist not tied to a desk.

I was alone only for a moment before Charles Randolph Singer himself came out. He was a short, slightly rumpled-looking man a great deal younger than his reputation had led me to expect. His white lab coat hung open, revealing a pocket jammed full of pens and other instruments. "Char-

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lie Singer," he said. "You're Doctor Wilkes?"

"Yes."

He shook my hand. "You sure did hand us one larruping good problem." Then he cocked his head sideways and looked at me. "Where'd you get the samples?"

"I'd . . . rather not say yet."

"Hunh. Doctor-patient crap, right? Well, you're paying my rent with this job, so I won't push it. Come on in back. I'll let Jessie explain things."

I followed Singer into a larger room lined with lab benches and machines. A desiccator and a centrifuge, a mass spec, a lot of other equipment I didn't recognize. A large aquarium filled with brackish water, fish and trash occupied one corner. The plastic beverage can rings and soda bottles were dissolving into a floating, liquid scum, which the fish calmly ignored.

"Jessie!" Singer said. "Wilkes is here."

A round-faced woman peered around the side of the mass spectrometer. "Oh," she said. "You." She was wearing a headset similar to the receptionist's.

"Jessica Burton-Peeler," said Singer introducing us, "is the second-best geneticist on the face of the planet."

Peeler smiled sweetly. "That was last year, Charlie." She spoke with a slight British accent.

Singer laughed and pulled a stick of gum from the pocket of his lab coat. He unwrapped it and rolled it into a ball between his fingers. "Tell Doctor Wilkes here what we found." He popped the wad of gum into his mouth.

"Would you like some tea or coffee, Doctor? I can have Eamonn bring you a cup."

"No, thanks. My wife is waiting downstairs. We were on our way to a dinner party, but I couldn't wait until tomorrow to find out."

Singer gave me a speculative look. "Find out what?"

"What you found out."

After a moment, Singer grunted and shrugged. "All right. We cultured all three cell samples," he said. "The 'B' sample was normal in all respects. The cells went through fifty-three divisions."

"Which is about average," Peeler added. "As for the other two . . . one of them divided only a dozen times—"

"The 'A' sample," I interjected.

"Yes," she said after a momentary pause. "The 'A' sample. But the 'C' sample . . . that one divided one hundred and twenty-three times."

I swallowed. "And that is . . . abnormal?"

"Abnormal?" Singer laughed. "Doc, that measurement is so far above the Gaussian curve that you can't even see abnormal from there."

"The 'A' sample wasn't normal, either," said Peeler quietly.

I looked at her, and she looked at me calmly and without expression. "Well," I said and coughed. "Well."

"So, what's next?" Singer demanded. "You didn't send us those tissue samples just to find out they were different. You already knew that—or you suspected it—when you sent them in. We've confirmed it. Now what?"

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"I'd like you to compare them and find out how their DNA differs."

Singer nodded after a thoughtful pause. "Sure. If the reason is genetic. We can look for factors common to several 'normal' samples but different for your 'A' and 'C' samples. Run polymerase chain reactions. Tedious, but elementary."

"And then. . . ." I clenched and unclenched my fists. "I've heard you work on molecular modifiers."

"Nanomachines," said Singer. "I have a hunch it'll be a big field someday, and I'm planning to get in on the ground floor." He jerked a thumb over his shoulder at the aquarium. "Right now I'm working on a bacterium that eats plastic waste."

"Dear Lord," said Burton-Peeler in sudden wonder. "You want us to modify the DNA, don't you?"

Singer looked from me to his wife. "Modify the DNA?"

"Yes," I started to say.

Burton-Peeler pursed her lips. "Modify the 'A' sample, of course. Whatever factor we find in the 'C' sample that sustains the cell division . . . you want us to splice that into the short-lived sample."

I nodded, unable to speak. "I thought it might be possible to bring it up to normal."

Singer rubbed his jaw. "I don't know. Splicing bacterial DNA is one thing. Human DNA is another. A universe more of complexity. Of course, there is that business with the multiple sclerosis aerosol. They used a modified rhinovirus to carry the mucous-producing genes into the lungs. If the factor is gene specific, we could do something similar. Infect the cells with a retrovirus and—"

"Then you can do it?"

"Now hold on. I said no such thing. I said *maybe* it was possible, *if* the chips fall right. But there'll be some basic research needed. It will cost. A lot."

"I'll . . . find the money. Somehow."

Singer shook his head slowly. "I don't think you can find that much. You're talking about maybe three to five years research here."

"Three to—" I felt the pit of my stomach drop away. "I don't have three to five years." Dee-dee would be dead by then. And Mae, too, taking the secret in her genes with her.

"We'll do it at cost," said Burton-Peeler. Singer turned and looked at his wife.

"What?"

"We'll do it at cost, Charlie, I'll tell you why later." She looked back to me. "Understand, we still cannot promise fast results. When you set off into the unknown, you cannot predict your arrival time."

Go for broke. Damn the torpedoes. "Just try is all I ask."

Burton-Peeler saw me out. On the landing to the stairwell she stopped. "You're the father of the young girl with progeria," she said. "I saw it in the paper a few years ago. The 'A' sample was hers, wasn't it?"

I nodded. "Yes, and the second sample was my own. For comparison." I turned to go.

Peeler stopped me with an arm on my sleeve. She looked into my eyes. "Whose was the third sample?" she

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asked.

I smiled briefly and sadly. "My faith, that the Universe balances."

In the lobby, Brenda was just handing a tea cup and saucer back to Singer's red-haired receptionist when she saw me coming. With a few brisk motions she collected her things and was already breezing out the door as I caught up with her.

"I'll drive," she said. "We're way behind schedule now, thanks to you."

I said nothing and she continued in what was supposed to be an idly curious tone. "Who was that woman with you? The one on the landing."

"Woman? Oh, that was Jessica Burton-Peeler. Singer's wife."

Brenda arched an eyebrow and made a little moue with her lips. "She's a little on the plump side," she said. "Do you find plump women attractive?"

I didn't have the time to deal with Brenda's insecurities. "Start the car," I told her. "We'll be late for dinner."

They say we are aged and gray, Maggie
As spray by the white breakers flung;
But to me you're as fair as you were, Maggie,
When you and I were young.

Mae Holloway lay between white sheets, coupled to tubes and wires. She lay with her eyes closed, and her arms limp by her sides atop the sheets. Her mouth hung half-open. She seemed grey and shrunken; drawn, like a wire through a die. Her meager white hair was nearly translucent.

She looked like a woman half her age.

Noor Khan was sitting near the wall reading a magazine. She looked up as I entered the room. "They told you?"

"That Mae has recovered consciousness? Yes. I'm surprised to see you still here."

Khan looked at the bed. "I have made arrangements. She has no family to keep watch."

"No," I agreed. "They are long gone." Longer than Khan could suppose. "Is she sleeping?"

She hesitated a moment, then spoke in a whisper. "Not really. I think that as long as she keeps her eyes closed she can pretend she is not in hospital. Those memories of hers . . . the consciousness-doubling, you called it. I think they play continually, now. The pressure from the tumor on the temporal lobe."

I nodded. Suppress all external stimuli and Mae could—in a biological kind of virtual reality—live again in the past. If we spoke too loudly, it would bring her back to a time and place she did not want. "Why don't you take a break?" I said. "I'll sit with her for a while."

Khan cocked her head to the side and looked at me. "You will?"

"Yes. Is that so surprising?"

She started to say something and then changed her mind. "I will be in the cafeteria." And then she fluttered out.

When she was gone, I pulled the chair up to the bedside and sat in it. "Mae? It's Doctor Wilkes." I touched her gently on the arm, and she

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seemed to flinch from the contact. "Mae?"

"I hear yuh," she said. Her voice was low and weak and lacked her usual snap. I had to lean close to hear her. "It'ud pleasure me if you'd company for a mite. It's been mighty lonely up hyar."

"Has it? But Doctor Khan—"

"I kilt the b'ar," she whispered, "but it stove up Pa something awful. He cain't hardly git around no more, so I got to be doin' for him." She paused as if listening. "I'm not so little as that, mister; I jest got me a puny bone-box. I ain't no yokum. I been over the creek. And I got me a Tennessee toothpick, too, in case you have thoughts about a little girl with a crippled-up Pa. What's yore handle, mister?"

"Mrs. Holloway," I said gently. "Don't you know me?"

Mae giggled. "Right pleased to meet you, Mister Holloway. Greenberry's a funny name, so I'll just call you Mister. If you'll set a spell, I'll whup up a bait to eat. H'ain't much, only squirrel, but I aim to go hunting tomorry and find a deer that'll meat us for a spell."

I pulled back and sat up straight in my chair. She was reliving her first meeting with Green Holloway. Was she too far gone into the quicksand of nostalgia to respond to me? "Mae," I said more loudly, shaking her shoulder. "It's Doctor Wilkes. Can you hear me?"

Mae gasped and her eyes flew open. "Whut...? Where...?" The eyes lighted on me and went narrow. "You."

"Me," I agreed. "How are you feeling, Mrs. Holloway?"

"I'm a-gonna die. How do you want me to feel?"

Relieved? Wasn't there a poem about weary rivers winding safe to the sea? But, no matter how long and weary the journey, can anyone face the sea at the end of it? "Mrs. Holloway, do you remember the time you were on the White House lawn and the president came out?"

Her face immediately became wary and she looked away from me. "What of it?"

"That president. It was Lincoln, wasn't it?"

She shook her head, a leaf shivering in the breeze.

I took a deep breath. "The Sanitary Commission was the Union Army's civilian medical corps. If you were wearing that uniform, you were remembering the 1860s. That business on the lawn. It happened. I looked it up. The dancing. 'Listen to the Mockinbird.' Lincoln coming outside to join the celebration. The whole thing. You know it, but you won't admit it because it sounds impossible."

"Sounds impossible?" She turned her head and looked at me at last. "How could I remember Lincoln? I'm not *that* old!"

"Yes, you are, Mae. You are that old. It's just that those early memories have gone all blurry. It's become hard for you to tell the decades apart. Your oldest memories had faded entirely, until your stroke revived them."

"You're talking crazy."

"I think it must be a defense mech-

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anism," I went on as if she had not spoken. "The blurring and forgetting. It keeps the mental desktop cleared of clutter by shoving the old stuff aside."

"Doc. . . ."

"But, every now and then, one of those old, faded memories would pop up, wouldn't it? Some impossible recollection. And you would think—"

"That I was going crazy." In a whisper, half to herself, she said, "I was always afraid of that, as long back as I can remember."

No wonder. Sporadic recollections of events generations past. Could a sane mind remember meeting Lincoln? "Mae. I found your name in the 1850 census."

She shook her head again. Disbelief. But behind it . . . hope? Relief that those impossible memories might be real? "Doc, how can it be possible?"

I spread my hands. "I don't know. Something in your genes. I have some people working on it, but . . . I think you have been aging slow. I don't know how that is possible. Maybe it has never happened before. Maybe you're the only one. Or maybe there were others and no one ever noticed. Maybe they were killed in accidents; or they really did go mad; or they thought they were recalling past lives. It doesn't matter. Mae, I've spent the last week in libraries and archives. You were born around 1800."

"No!"

"Yes. Your father was a member of Captain James Scott's settlement company. The Murrays, the Hammontrees, the Holloways, the Blacks and others. The overmountain men, they were called. They bought land near Six Mile Creek from the Overhill Cherokees."

I paused. Mae said nothing but she continued to look at me, slowly shaking her head. "Believe me," I said. "Your father's name was Josh, wasn't it?"

"Josiah. Folks called him Josh. I . . . I had forgotten my folks for such a long time; and now that I can remember, it pains me awful."

"Yes. I overheard. A bear mauled him."

"Doc, he was such a fine figure of a man. Right portly—I mean, handsome. He cut a swath wherever he walked. To see him laid up like that. . . . Well, it sorrowed me something fierce. And him always saying I shouldn't wool over him."

"He died sometime between 1830 and 1840, after you married Green Holloway."

She looked into the distance. "Mister, he was a long hunter. He come on our homestead one day and saw how things stood and stayed to help out. Said it wasn't fittin' for a young gal to live alone like that with no man to side her. 'Specially a button like I was. There was outlaws and renegades all up and down the Trace who wouldn't think twice about bothering a young girl. When Pa finally said 't was fittin,' we jumped the broom 'til the preacher-man come through." She stopped. "Doc?"

"Yes?"

"Doc, you must have it right. Because . . . because, how long has it been since folks lived in log cabins,

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and long hunters dressed up in buckskins?"

"A long time," I said. "A very long time."

"Seems like just a little while ago to me, but I know it can't be. The Natchez Trace? I just never gave it much thought."

Have you ever seen a neglected field overgrown with weeds? That was Mae's memory. Acres of thistle and briar. All perspective lost, all sense of elapsed time. "Your memories were telescoped," I said. "Remember when you sang 'Sweet Betsy from Pike' for me, and you said how real it all seemed to you? Well, after the Civil War, sometime during the Great Depression of the 1870s, you went out west, probably on one of the last wagon trains, after they finished the railroad. After that, I lost track."

She stayed quiet for a long time and I began to think she had dozed off. Then she spoke again.

"Sometimes I remember the Tennessee hills," she said in a faraway voice, "all blue and purple and cozy with family." She sighed. "I loved them mountains," she said. "We had us a hardscrabble, side-hill farm. The hills was tilted so steep we could plow both sides of an acre. And the cows had their legs longer on the one side that the other so's they could stand straight-up." She chuckled at the hillbilly humor. "Oh, it was a hard life. You kids today don't know. But in the springtime, when the piney roses and star-flowers and golden bells was in bloom, and the laurel hells was all purpled up; why, doc, you couldn't ask God for a purtier sight." She sighed. "And other times . . . other times, I remember a ranch in high-up, snow-capped mountains with long-horned cattle and vistas where God goes when He wants to feel small. There was a speakeasy in Chicago, where the jazz was hot; and a bawdy house in Frisco, where I was." She let her breath out slowly and closed her eyes again. "I remember wearing bustles and bloomers, and linen and lace, and homespun and broadcloth. I've been so many people, I don't know who I am."

She opened her eyes and looked at me. "But I was always alone, except in them early years. With Mister. And with Daddy and my brother Zach." A tear dripped down the side of her face. I pulled a tissue from the box and blotted it up for her. "There weren't nobody left for me. Nobody."

I hesitated for a moment. Then I said, "Mae, you never had a brother."

"Now what are you talking about? I remember him clear as day."

"I've checked the records. Your mother died and your father never remarried."

Mae started to speak, then frowned. "Pa did tell me oncet that he'd never hitch ag'in, because he loved the dust of Ma's feet and the sweat of her body more than he loved any other woman. But Zach—"

"Was your own child."

She sucked in her breath between clenched teeth. "No, he weren't! He was near my own age."

"You remember Zach from 1861 when he followed your husband into the army. He was twenty-two then,

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and you. . . . Well, you seemed to be thirty-seven to those around you. So, in your memory he seems like a brother. By the time you rejoined him on his ranch in Wyoming, he was even a bit older than your apparent age. Remember how you thought he resembled Mister? Well, that was because he was Mister's son. I think . . . I think that was when you started forgetting how the years passed for you. Mae, no one ever ran out on you. You just outlived them. They grew old and they died and you didn't. And after a while you just wouldn't dare get close to anyone."

Tears squeezed from behind her eyes. "Stop it! Every time you say something, you make me remember."

"In all this time, Mae, you've never mentioned your child. You did have one; the clinical evidence is there. If Zach wasn't your boy, who was? Who was the boy sitting next to you at the minstrel show in Knoxville?"

She looked suddenly confused, and there was more to her confusion than the distance of time. "I don't know." Her eyes glazed and she looked to her right. I knew she was re-seeing the event. "Zach?" she said. "Is that you, boy? Zach? Oh, it is. It is." She refocused on me. "He cain't hear me," she said plaintively. "He hugged me, but I couldn't feel his arms."

"I know. It's only a memory."

"I want to feel his arms around me. They grow up so fast, you know. The young-uns. One day, they're a baby, cute as a button; the next, all growed up and gone for a soldier. All growed up. I could see it happening. All of 'em, getting older and older. I thought there was something wrong with me. That I'd been a bad girl, because I kilt my Ma; and the Good Man was punishing me by holding me back from the pearly gates. If'n I never grew old, I'd never die. And if I never died, I'd never see any of my kin-folk again. Doc, you can't know what it's like, knowing your child will grow old and wither like October corn and die right before your eyes."

For a moment, I could not breathe. "Oh, I know," I whispered. "I know."

"Zach. . . . I lived to see him turn to dust in the ground. He died in my own arms, a feeble, old man, and he asked me to sing 'Home, Sweet Home,' like I used to when he was a young 'un. Oh, little Zach!" And she began to cry in earnest. She couldn't move her arms to wipe the tears away, so I pulled another tissue from the box on the tray and dabbed at her cheeks.

She reached out a scrawny hand and clutched my arm. "Thank you, doc. Thank you. You helped me find my child again. You helped me find my boy."

And then I did an odd thing. I stood and bent low over the bed, and I kissed Mae Holloway on her withered cheek.

I'm going there to see my mother.
She said she'd meet me when I come.
I'm only going over Jordan,
I'm only going over home.

My days at the Home passed by in an anonymous sameness, dispensing medicines, treating aches and pains. Only a handful of people came to see

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me; and those with only trivial complaints. Otherwise, I sat unmolested in my office, the visitor's chair empty. I found it difficult even to concentrate on my journals. Finally, almost in desperation, I began making rounds, dropping in on Rosie and Jimmy and the others, chatting with them, enduring their pointless, rambling stories; sometimes suggesting dietary or exercise regimens that might improve their well-being. Anything to feel useful. I changed a prescription on Old Man Morton, now the Home's Oldest Resident, and was gratified to see him grow more alert. Sometimes you have to try different medications to find a treatment that works best for a particular individual.

Yet somehow those days seemed empty. The astonishing thing to me was how little missed Mae Holloway was by the other residents. Oh, some of them asked after her politely. Jimmy did. But otherwise it was as if the woman had evaporated, leaving not even a void behind. Partly, I suspected, it was because they were unwilling to face up to this reminder of their own mortality. But partly, too, it must have been a sense of relief that her aloof and abrasive presence was gone. If she never had any friends, Mae had told me, she wouldn't miss them when they were gone. But neither did they miss her.

I usually stopped at the hospital on my way home, sometimes to obtain a further tissue sample for Singer's experiments, sometimes just to sit with her. Often, she was sedated to relieve the pain of the tumor. More usually, she was dreaming; adrift on the river of years, connected to our world and time by only the slenderest of threads.

When she was conscious, she would spin her reminiscences for me and sing. "Rosalie, the Prairie Flower." "Cape Ann." "Woodsman, Spare that Tree." "Ching a Ring Chaw." "The Hunters of Kentucky." "Wait for the Wagon." We agreed, Mae and I, that a wagon was just as suitable as a Chevrolet for courting pretty girls, and Phyllis and her wagon was the ancestor of Daisy and her bicycle, Lucille and her Oldsmobile, and Josephine and her flying machine. And someday, I suppose, Susie and her space shuttle.

It was odd to see Mae so at peace with her memories. She no longer feared them; no longer suppressed them. She no longer fled from them. Rather, she embraced them and passed them on to me. When she sang, "Roisin the Beau," she remarked casually how James Polk had used its melody for a campaign song. She recollected without flinching that she had voted for Zachary Taylor. "Old Rough and Ready," she said. "There was a man for you. 'Minds me some'at of that T.R. Too bad they pizened him, but he was out to break the slave power." It gave her no pause to recall how at New Orleans, "*There stood John Bull in martial pomp/And there stood Old Kentucky.*" It must have been an awful relief to acknowledge those memories, to relax in their embrace.

There were fond memories of her "bean," Green the Long Hunter. Of days spent farming or hunting or

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spinning woolen or cooking 'shine. Of nights spent 'setting' by the fire, smoking their pipes, reading to each other from the Bible. Quiet hours from a time before an insatiable demand for novelty—for something always to be *happening*—had consumed us. Green had even taken her down to Knoxville to see the touring company of *The Gladiator*, a stage play about Spartacus. Tales of slave revolts did not play well elsewhere in the South, but the mountaineers had no love for the wealthy flatland aristocrats.

She recalled meeting Walt Whitman, a fellow nurse in the Sanitary Commission. "A rugged fellow and all full of himself," she recalled, "but as kind and gentle with the men as any of the women-folk."

She still confused her son sometimes with a brother, with her father, with Green. He was younger, he was older, he was of her own age. But there were childhood memories, too, of the sort most parents have. How he had "spunked up with his gal," "spooned with his chicken," or "lollygagged with his peach," depending on the slang of the decade. How they had "crossed the wide prairie" together after the War and set up a ranch in Wyoming Territory. How he met and wed Sweet Annie, a real "piece of calico."

Not all the memories were pleasant—Sweet Annie had died screaming—but Mae relished them just the same. It was her life she was reclaiming, and a life consists of different parts good and bad. The parts make up a whole. I continued to record her tales and tunes, as much because I did not know what else to do as because of any book plans. I noticed that, while her doubling episodes often hopscotched through her life—triggered by associations and chance remarks—the music that played in her mind continued its slow and inexorable backward progression, spanning the 1840s and creeping gradually into the mid-thirties.

Slowly, a weird conviction settled on me. When the dates of her rememb-heard tunes finally reached 1800, she would die.

Time was running short. Most brain tumor patients did not survive a year from the time of first diagnosis; and Mae was so fragile to begin with that I doubted a whole year would be hers. Reports from Singer alternated between encouragement and frustration. Apparent progress would evaporate with a routine, follow-up test. Happenstance observation would open up a whole new line of inquiry. Singer submitted requests for additional cell samples almost daily. Blood, skin, liver. It seemed almost as if Mae might be used up entirely before Singer could pry loose the secret of her genes and splice that secret into my Deirdre.

I began to feel as if I were in a race with time. A weird sort of race in which time was speeding off in both directions. A young girl dying too old. An old woman dying too young.

One day, Wing was waiting for me when I entered the hospital. Seeing the flat look of concern on his face,

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my heart faltered. *Not yet*, I thought; *not yet!* My heart screeched, but I kept my own face composed. He took me aside into a small consultation room. Plaster walls with macro designs painted in happy, soothing colors. Comfortable chairs; green plants. An appallingly cheerful venue in which to receive bad news.

But it was not bad news. It was good news, of an odd and unexpected sort.

"Herpes?" I said when he had told me. "Herpes is a cure for brain tumors?" I couldn't help it. I giggled.

Wing frowned. "Not precisely. Culver-Blaese is a new treatment and outside my field of specialty, but let me explain it as Maurice explained it to me." Maurice LeFevre was the resident in genetic engineering, one of the first such residencies in the United States. "Several years ago," said Wing, "Culver and Blaese successfully extracted the gene for the growth enzyme, thymidine kinase, from the herpes virus, and installed it into brain tumor cells using a harmless retrovirus."

"I would think," I said dryly, "that an enzyme that facilitates reproduction is the last thing a brain tumor needs spliced into its code."

Wing blinked rapidly several times. "Oh, I'm sorry. You see it's the ganciclovir. I didn't make that clear?"

"Ganciclovir is—?"

"The chemical used to fight herpes. It reacts with thymidine kinase, and the reaction products interfere with cell reproduction. So if tumor cells start producing thymidine, injecting ganciclovir a few days later will gum up the tumor's reproduction and kill it. There have been promising results on mice and an initial trial with twenty human patients."

"What is 'promising'?"

"Complete remission in 75 percent of the cases, and appreciable shrinkage in all of them."

I sucked in my breath. I could hardly credit what Wing was telling me. Here was a treatment, a *deus ex machina*. Give Singer another year of live tissue experiments and he would surely find the breakthrough we sought. "What's the catch?" I asked. There had to be a catch. There was always a catch.

There were two.

"First," said Wing, "the treatment is experimental, so the insurance will not cover it. Second . . . well, Mrs. Holloway has refused."

"Eh? Refused? Why is that?"

Wing shook his head. "I don't know. She wouldn't tell me. I thought if I caught you before you went to see her—"

"That I could talk her into it?"

"Yes. The two of you are very close. I can see that."

Close? Mae and I? If Wing could see that, those thick eyeglasses of his were more powerful than the Hubble telescope. Mae had not been close to anyone since her son died. *Since her child died in her arms, an old, old man.* Inwardly, I shuddered. No wonder she had never gotten close to anyone since. No wonder she had lost an entire era of her life.

"I'll give it a try," I said.

When I entered her room, Mae was

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lying quietly in her bed, humming softly. Awake, I knew, but not quite present. Her face was curled into a smile, the creases all twisted around in unwonted directions. There was an air about her, something halfway between sleep and joy, a *calm* that had inverted all those years of sourness, stood everything on its head, and changed all her minus signs to plus.

Setting on her cabin porch, I imagined, gazing down the hillside at the laurel hells, and at a distant, pristine stream meandering through the holler below. At peace. At last.

I pulled the visitor's chair by the bedside and laid a hand lightly on her arm. She didn't stir. "Mae, it's me. I've come to set a spell with you."

"Howdy there, doc," she whispered. "Oh, it's such a lovely sunset. All heshed. I been telling Li'l Zach about the time his grandpap and Ol' Hickory went off t' fi't the Creeks. I was already fourteen when Pa went off, so I minded the cabin while he was away."

I leaned closer to her. "Mae, has Dr. Wing spoken to you about the new treatment?"

She took in a long, slow breath, and let it out as slowly. "Yes."

"He told me you refused."

"I surely did that."

"Why?"

"Why?" She opened her eyes and looked at me; looked sadly around the room. "I been hanging on too long. It's time to go home."

"But—"

"And what would it git me, anyways? Another year? Six months? Doc, even if I am nigh on to two hunnert year, like you say, and my bone-box only thinks it's a hunnert, *that's still older'n most folks git.* Even if that Doctor LeFevre can do what he says and rid me of this hyar tumor, there'll be a stroke afore long or my ticker'll give out, or something. Doc, *there ain't no point to it.* When I was young, when I was watching everyone I knew grow old and die, I wanted to go with them. I wanted to be with them. Why should I want to tarry now? If the Lord'll have me, I'm ready." She closed her eyes again and turned a little to the side.

"But, Mae—"

"And who'll miss me, beside?" she muttered.

"I will."

She rolled out flat again and looked at me. "You?"

"Yes. A little, I guess."

She snorted. "You mean you'll miss whatever you want that you're wooling me over. Always jabbing me with needles, like I was a pincushion. There's something gnawing away at you, Doc. I kin see it in your eyes when you think no one is looking. Kind of sad and angry and awful far away. I don't know what it is, but I know I got something to do with it."

I drew back under her speech. Her words were like slaps.

"And suppose'n they do it and they do git that thang outen my brain. Doc, what'll happen to my music? What'll happen to my memories?"

"I—"

"You done told me they come from that tumor a-pressing against the brain. What happens if it's not pressing any longer?"

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"The memories might stay, now that they've been started, even with the original stimulus removed. It might have been a 'little stroke' that started it, just like we thought originally."

"But you can't guarantee it, can you?" She fixed me with a stare until I looked away.

"No. No guarantees."

"Then I don't want it." I turned back in time to see her face tighten momentarily into a wince.

"It will relieve the pain," I assured her.

"Nothing will relieve the pain. Nothing. Because it ain't that sort of pain. There's my Pa, my Ma, Green, Little Zach and his Sweet Annie. Ben and Joe and all the others I would never let cozy up to me. They're all waiting for me over in Gloryland. I don't know why the Good Man has kept me here so long. H'isn't punishment for killing Ma. I know that now. There must be a reason for it; but I'm a-weary of the waiting. If'n I have this operation like you want, what difference will it make? A few months? Doc, I won't live those months in silence."

My Chloe has dimples and smiles, I must own;
But, though she could smile, yet in truth she could frown.
But tell me, ye lovers of liquor divine,
Did you e'er see a frown in a bumper of wine?

There is something about the ice cold shock of a perfect martini. The pine tree scent of the gin. The smooth liquid sliding down the throat. Then, a half second later, wham! It hits you. And in that half second, there is an hour of insight; though, sometimes, that hour comes very late at night. You can see with the same icy clarity of the drink. You can see the trail of choices behind you. Paths that led up rocky pitches; paths beside still waters. You can see where the paths forked, where, had you turned that way instead of this, you'd not be here today. You can even, sometimes, see where, when the paths forked, people took different trails.

"Paul!"

And you can wonder whether you can ever find that fork again.

I turned to see Brenda drop her briefcase on the sofa. "Paul! I *never* see you drinking."

Subtext: Do you drink a lot in secret when I can't see you? Sub-subtext: Are you an alcoholic? Holding a conversation with Brenda was a challenge. Her words were multi-layered; and you never knew on which layer to answer.

I placed my martini glass, still half-full, carefully down upon the sideboard, beside the others. It spilled a little as I did, defying the laws of gravity. I faced her squarely. "I'm running out of time," I said.

She looked at me for a moment. Then she said, "That's right. I'd wondered if you knew."

"I'm running out of time," I repeated. "She'll die before I know."

"*She*...." Brenda pulled her elbows in tight against her sides. "I don't want to hear this."

"That old woman. To live so long,

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only to die just now."

"The old woman from the home? *She* has you upset? For God's sake, Paul." And she turned away from me.

"You don't understand. She could save Dee-dee."

Brenda's head jerked a little to the left. Then she retrieved her briefcase and shook herself all over, as if preparing to leave. "How can a dying old woman save a dying old girl?"

"She's yin to Dee-dee's yang. The Universe is neutral. There's a plus sign for every minus. But she wants to go over Jordan and I . . . can't stop her. And I don't understand why I can't."

"You're not making any sense, Paul. How many of those have you had?"

"She's two centuries old, Brenda. Two centuries old. She was a swinger and a sheba and a daisy and a pippin. She hears songs, in her head; but sometimes they're wrong, except they're right. The words are different. Older. 'Old Zip Coon,' instead of 'Turkey in the Straw.' 'Lovely Fan', instead of 'Buffalo Gals.' 'Bright Mohawk Valley,' instead of 'Red River Valley.' She read *Moral Physiology*, when it first came out. Mae did. Do you know the book? *Moral Physiology*, by Robert Dale Owen? No, of course not. It was all about birth control and it sold twenty-five thousand copies even though newspapers and magazines refused to carry the ads *and it was published in 18-god-damned-30.* She voted for Zachary Taylor, and her Pa fought in the Creek War, and her husband died at Resaca, and she saw Abraham-fucking-Lincoln—"

"Paul, can you hear yourself? You're talking crazy."

"Did you know *The Gladiator* debuted in New York in 1831? 'Ho! slaves, arise! Freedom . . . Freedom and revenge!' " I struck a pose, one fist raised.

"I can't stand to watch you like this, Paul. You're sopping drunk."

"And you're out late every night." Which was totally irrelevant to our discussion, but the tongue has a life of its own.

Through teeth clenched tight, she answered: "I have a job to keep."

I took a step away from the sideboard, and there must have been something wrong with the floorboards. Perhaps the support beam had begun to sag, because the floor suddenly tilted. I grabbed for the back of the armchair. The lamp beside it wobbled and I grabbed it with my other hand to keep it still.

Awkwardly twisted, half bent over, I looked at Brenda and spoke distinctly. "Mae Holloway is two centuries old. There is something in her genes. We think. Singer and Peeler and I. We think that with enough time. With enough time. Singer and Peeler can crack the secret. They can tailor a . . . tailor a. . . ." I hunted for the right word, found it scuttling about on the floor and snatched it. "Nanomachine." Triumph. "Tailor a nanomachine that can repair Dee-dee's cells. But Mae is dying. She has a brain tumor, and it's killing her. There's a treatment. An experimental treatment. It looks very good. But Mae won't take it. She doesn't want it. She wants to sleep."

I don't know what I expected. I expected hope, or disbelief. I expected

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a demand of proof, or for more details. I expected her to say, 'do anything to save my daughter!' I expected anything but indifference.

Brenda brushed imaginary dust from her briefcase and turned away. "Do what you always do, Paul. Just ignore what she wants."

I was in the clinic at the Home the next day when I received the call from the hospital. My head felt as if nails had been driven into it. I was queasy from the hangover. When the phone rang and I picked it up, a tinny voice on the other end spoke crisply and urgently and asked that I come over right away. I don't remember what I said, or even that I said anything; and I don't suppose my caller expected a coherent answer. My numb fingers fumbled the phone several times before it sat right in its cradle. *Heart attack*, I thought. And as quickly as that, the time runs out.

But they hadn't said she was dead. They hadn't said she was dead.

I hope that there was no traffic on the road when I raced to the hospital, for I remember nothing of the journey. Three times along the way I picked up the car phone to call the hospital for more information, and three times I replaced it. It was better not to know. Half an hour, with the lights right and the speed law ignored. That was thirty minutes in which hope was thinkable.

Smythe, the cardio-vascular man, met me in the corridor outside her room. He grabbed me by both my arms and steadied me. I could not understand why he was grinning. What possible reason could there be?

"She'll live, mon," he said. "It was a near thing, but she'll live."

I stared at Smythe without comprehension. He shook me by the arm, hard. My head felt like shattered glass.

"She'll live," he said again. His teeth were impossibly white.

I brushed him off and stepped into the room. *She'll live?* Then there was still time. Everything else was detail. My body felt suddenly weak, as if a stopcock had been pulled and all my sand had drained away. I staggered as far as the bed side, where I sank into a steel and vinyl chair. Smythe waited by the door, in the corridor, giving me the time alone.

Dee-dee lay asleep upon the bed, breathing slowly and softly through a tube set up her nose. An intravenous tube entered her left arm. Remote sensor implants on her skull and chest broadcast her heartbeat and breathing and brain waves to stations throughout the hospital. Smythe was never more than a terminal away from knowing her condition. I reached out and took her right hand in mine and gently stroked the back of it. "Hello, Dee-dee, I came as fast as I could. Why didn't. . . ." I swallowed hard. "Why didn't you wait for me to tuck you in?"

Dee-dee was still unconscious from the anesthetic. She couldn't hear me; but a quiet sob, quickly stifled, drew my attention to the accordion-pleated expandable wall, drawn halfway out on the opposite side of the bed. When I walked around it, I saw Consuela sitting in a chair on the

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other side. Her features were tightly leashed, but the tracks of tears had darkened both her cheeks. Her hands were pale where they gripped the arms of the chair.

"Connie!"

"Oh, Paul, we almost lost her. We almost lost her."

It slammed against my chest with the force of a hammer, a harder stroke for having missed. *Someday we will.* I took Connie's hand and brushed the backside of it as I had brushed Dee-dee's. "It's all right now," I said.

"She is such a sweet child. She never complains."

Prognosis: The life span is shortened by relentless arterial athermoatosis. Death usually occurs at puberty.

"She's all right now."

"For a little while. But it will become worse, and worse; until...." She leaned her head against me and I cradled her; I rubbed her neck and shoulders, smoothed her hair. With my left hand, I caressed her cheek. *It is not the end; but it is the beginning of the end.*

"We knew it would happen." The emotions are a very odd thing. When all was dark, when I believed myself helpless, I could endure that knowledge. It was my comfort. But now that there was a ray of light, I found it overwhelming me, crushing me so that I could hardly breathe. A sliver of sunshine makes a darkened room seem blacker still. I could live with Fate, but not with Hope. I found that there was a new factor in the equation now. I found that I could fail.

"Where is Brenda?" I asked.

Connie pulled herself from my arms, turned and pulled aside the curtain that separated her from Deirdre. "She didn't come."

"What?"

"She didn't come."

Something went out of me then, like a light switch turned off. I didn't say anything for the longest time. I drifted away from Connie over toward the window. A thick stand of trees filled the block across the street from the hospital. Leaves fresh and green with spring. Forsythia bursting yellow. A flock of birds banked in unison over the treetops and shied off from the high tension lines behind. I thought of the time when Brenda and I first met on campus, both of us young and full of the future. I remembered how we had talked about making a difference in the world.

I found Brenda at home. I found her in the family room, late at night after I had finally left the hospital. She was still clad in her business suit, as if she had just come from the office. She was standing rigidly by the bookcase, with her eyes dry and red and puffy, with Dee-dee's book, *The Boxcar Children,* in her hands. I had the impression that she had stood that way for hours.

"I tried to come, Paul," she said before I could get any words out. "I tried to come, but I couldn't. I was paralyzed; I couldn't move."

"It doesn't matter," I said. "Connie was there. She'll stay until I get changed and return." I rubbed a hand across my face. "God, I'm tired."

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"She's taken my place, hasn't she? She feeds Deirdre, she nurses her, she tutors her. Tell me, Paul, has she taken over *all* my duties?"

"I don't know what you mean."

"I didn't think there was room in your life for anyone beside your daughter. You've shut everyone else out."

"I never pushed you away. You ran."

"It needs more than that. It needs more than not pushing. You could have caught me, if you'd reached. There was an awful row at the office today. Crowe and FitzPatrick argued. They're dissolving the partnership. I was taking too long to say yes to the partnership offer; so Sèan became curious and.... He found out Walther had wanted a 'yes' on a lot more, so we filed for harrass.... Oh, hell. It doesn't matter any more; none of it."

She was talking about events on another planet. I stepped to her side and took hold of the book. It was frozen to her fingers. I tugged, and pried it from her grasp. Slowly, her hands clenched into balls, but she did not lower her arms. I turned to place the book on the shelf and Brenda said in a small voice, "It doesn't go there, Paul."

"Damn it, Brenda!"

"I'm afraid," she said. "Oh, God, I'm afraid. Someday I will open up the tableware drawer and find her baby spoon; or I'll look under the sofa and find a ball that had rolled there forgotten. Or I'll find one of her dresses bundled up in the wash. And I won't be able to take it. Do you understand? Do you know what it's like? Do you have any feelings at all? How can you look at that shelf and remember that *her* book had once lain there? Look at that kitchen table and remember her high chair and how we played airplane with her food? Look into a room full of toys, with no child any more to play with them? Everywhere I look I see an aching void."

With a sudden rush of tenderness, I pulled her to me, but she remained stiff and unyielding in my arms. Yet, we all mourn in our own ways. "She did not die, Brenda. She'll be OK."

"This time. But, Paul, I can't look forward to a lifetime looking back. At the little girl who grew up and grew old, and went away before I ever got to know her. Paul, it isn't right. It isn't right, Paul. It isn't right for a child to die before the parent."

"So, you'll close her out of your mind? Is that the answer? Create the void now? You'll push all those memories into one room and then close the door? You can't do that. If we forget her, it will be as if she had never lived."

She softened at last and her arms went around me. "What can I do? I've lost her, and I've lost you, and I've lost . . . everything."

We stood there locked together. I could feel her small, tightly-controlled sobs trembling against me. Sometimes the reins have been held so close for so long that you can never drop them, never even know if they have been dropped. The damp of her tears seeped through my shirt. Past her, I could see the shelf with *The Boxcar Children* lying flat upon it and I tried to imagine how, in future

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years, I could ever look on that shelf again without grief.

"Tell me the tales that to me were so dear
Long, long ago; long, long ago.
Sing me the songs I delighted to hear
Long, long ago, long ago."

Dee-dee was wired. There was a tube up her nose and another in her arm. A bag of glucose hung on a pole rack by her bed, steadily dripping into an accumulator and thence through the tube. A catheter took her wastes away. A pad on her finger and a cuff around her arm were plugged into a CRT monitor. I smiled when I saw she was awake.

"Hi, Daddy." Her voice was weak and hoarse, a byproduct of the anaesthesia.

"Hi, Dee-dee. How do you feel?"

"Yucky."

"Me, too. You're a TV star." I pointed to the monitor, where red and yellow and white lines hopped and skipped across the screen. Heart rate, blood pressure. Every time she breathed, the white line crested and dropped. She didn't say anything and I listened for a moment to the sucking sound that the nose tube made. A kid trying for the last bit of soda in the can. The liquid it carried off was brown, which meant that there was still a little blood. "Connie is here." I nodded to the other side of the bed.

Dee-dee turned her eyes, but not her head. "Hello, Connie. I can't see you."

Consuela moved a little into her field of vision. "Good morning, Little One. You have a splendid view from your window."

"Nurse Jeannie told me that. Wish I could see. . . ."

"Then, I will tell you what it looks like. You can see the north end of town—all those lovely, old houses—and far off past them, on the edge of the world, the blue-ridge mountain wall and, in the very center of it, the Gap; and through the Gap, you can see the mountains beyond."

"It sounds beautiful. . . ."

"Oh, it is. I wish I could be here instead of you, just so I could have the view."

I looked up at Connie when she said that and, for a moment, we locked gazes with one another. I could see the truth of her words in her eyes.

And then I saw surprise. Surprise and something else besides. I looked over my shoulder—and Brenda was standing there in the doorway, smartly dressed, on wobbly legs, with her purse clutched tightly in her hands before her.

"The nurses," she said. "The nurses said she could have two visitors at a time." Visiting was allowed every three hours, but only for an hour and only two visitors at a time. I was a doctor and Connie was a nurse and the staff cut us a little slack, but the rules were there for a reason. Consuela stood.

"I will leave."

Brenda looked at her and caught her lower lip between her teeth. She laid her purse with military precision on a small table beside the bed. "I would like to spend some time with

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Deirdre, Paul. If you don't mind."

I nodded. As I stood up I gave Dee-dee a smile and a little squeeze on her arm. "Mommy's here," I told her.

Connie and I left them alone together (a curious expression, that—"alone together") and waited in the outer nursing area. I didn't eavesdrop, though I did overhear Brenda whisper at one point, "No, darling, it was never anything that *you* did wrong." Maybe it wasn't much, not when weighted against those years of inattention. It wasn't much; but it wasn't nothing. I knew—maybe for the first time—how much it cost Brenda to take on these memories, to take on the risks of remembering; because she was right. If in later years you remembered nothing, you would feel no pain.

And yet, I had seen two centuries of pain come washing back, bringing with it joy.

Children recover remarkably well. Drop them, and they bounce. Maybe not so high as before, but they do rebound. Dee-dee bore a solemn air about her for a day or two, sensing, without being told, that she had almost "gone away." But to a child, a day is a lifetime, and a week is forever; and she was soon in the recovery ward, playing with the other children. Rheumatic children with heart murmurs; shaven-headed children staring leukemia in the face; broken children with scars and cigarette burns. . . . They played with an impossible cheerfulness, living, as most children did, in the moment. But then, the Now was all most of them would ever have.

There came a day when Dee-dee was not in her room when I arrived. Connie sat framed in a bright square of sunlight, reading a book. She looked up when I walked in. "Deirdre has gone to visit a new friend," she said.

"Oh." A strange clash of emotions: Happy she was up and about again, even if confined to a wheelchair; disappointed that she was not there to greet me.

"She will return soon, I think."

"Well," I said, "we had wanted her to become more active."

Consuela closed her book and laid it on the small table beside her. "I suppose you will no longer need my services," she said. She did not look at me when she said it, but out the window at the new-born summer.

"Not need you? Don't be foolish."

"She has her mother back, now."

Every morning before work; every evening after. Pressing lost years into a few hours. "She still needs you."

"The hospital staff cares for her now."

I shook my head. "It's not that she *needs* you, but that she needs *you*. You are not only her nurse."

"If I take on new clients," she went on as if I had not spoken, "I can do things properly. I can visit at the appointed times, perform my duties, and leave; and not allow them such a place in my heart when they are gone."

"If people don't leave a hole in your life when they are gone, Consuela, they were never in your life at all."

She turned away from the window

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and looked at me. "Or two holes."

I dropped my gaze, looked instead at the rumpled bed.

"In many ways," I heard her say, "you are a cold man, Doctor. Uncaring and thoughtless. But it was the fruit of bitterness and despair. I thought you deserved better than you had. And you love her as deeply as I. If death could be forestalled by clinging tight, Deirdre would never leave us."

I had no answer for her, but I allowed my eyes to seek out hers.

"I thought," she said, "sometimes, at night, when I played my flute, that because we shared that love . . . that we could share another."

"It must be lonely for you here, in a strange country, with a strange language and customs. No family and fewer friends. I must be a wretched man for never having asked."

She shook her head. "You had your own worry. A large one that consumed you."

"Consuela Montejo, if you leave, you would leave as great a hole in my life as in Dee-dee's."

"And in Mrs. Wilkes's." She smiled a little bit. "It is a very odd thing, but I believe that if I stayed I might even grow to like her."

"She was frightened. She thought she could cauterize the wound before she received it. It was only when she nearly lost Dee-dee that she suddenly realized that she had never had her."

Consuela stood and walked to the bed. She touched the sheet and smoothed it out, pulling the wrinkles flat. She shook her head. "It will hurt if I go; it will hurt if I stay. But Mrs. Wilkes deserves this one chance."

I reached out and took her hand, and she reached out and took mine. Had Brenda walked in then, I do not know what she would have made of our embrace. I do not know what I made of it. I think I would have pulled Brenda in with us, the three of us arm in arm in arm.

The really strange thing was how inevitable it all was in hindsight.

When I left Consuela, I went to visit Mae. It had been nearly two weeks since I had last seen her and it occurred to me that the old bat might be lonely, too. And what the hell, she could put up with me and I could put up with her.

I found my Dee-dee in Mae Holloway's room. The two of them had their heads bent close together, giggling over something. Deirdre was strapped to her electric wheelchair and Mae lay flat upon her bed; but I was struck by how alike they looked. Two gnarled and bent figures with pale, spotted skin stretched tight over their bones, lit from within by a pure, childlike joy. Two old women; two young girls. Deirdre looked up and saw me.

"Daddy! Granny Mae has been teaching me the most wonderful songs."

Mae Holloway lifted her head a little. "Yours?" she said in a hoarse whisper. "This woman-child is yours?"

"Yes," I said, bending to kiss Dee-dee's cheek. "All mine." No. Not *all* mine. There were others who shared

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her.

"Listen to the song Granny Mae taught me! It goes like this."

I looked over Dee-dee's head at the old woman. "She didn't tell you?"

"Noor brought her in, but didn't say aye, yea, or no. Just that she thought we should meet."

Dee-dee began singing in her high, piping voice.

"*The days go slowly by, Lorena.*
The snow is on the grass again.
The years go slowly by Lorena. . . ."

"Her days are going by too fast, ain't they?" Mae said. I nodded and saw how her eyes lingered on my little girl. "Growing old in the blink of an eye," she said softly. "Oh, I know how that feels."

"Granny Mae tells such interesting stories," Dee-dee insisted. "Did you know she saw Abraham Lincoln one time?" I rubbed her thinning hair. Too young to know how impossible that was. Too young to doubt.

Mae's hand sought out Dee-dee's and clenched hold of it. "Doc, I'll have me that operation."

"What?"

"I'll have me that operation. The one that's supposed to make this tumor of mine go away. I'll have it, even if my music and my memories go with it."

"You will? Why?"

"Because I know why you been poking me and taking my blood. And I know why the Good Lord has kept me here for all this long time."

Noor Khan was waiting in the hallway when I stepped out of the room.

"Ah, Doctor," I said. "How are things at Sunny Dale?"

"Quiet," she said. "Though the residents are all asking when you will be back."

I shrugged. "Old people dislike upsets to their routine. They grew used to having me around."

Khan said, "I never knew about your little girl. I heard it from Smythe. Why did you never tell me?"

I shrugged again. "I never thought it was anyone's business."

Khan accepted the statement. "After you told Wing and me of Mae's remarkable longevity, I knew you were taking blood samples to that genetic engineering firm—"

"Singer and Peeler."

"Yes. I thought you had . . . other reasons."

"What, that I would find the secret of the Tree of Life?" I shook my head. "I never thought to ask for so much. Mae has lived most her life as an old woman. I would not count that a blessing. But to live a normal life? To set right what had come out wrong? Yes, and I won't apologize. Neither would you, if it were your daughter."

"Is Singer close? To a solution?"

"I don't know. Neither do they. We won't know how close we are until we stumble right into it. But we've bought a little time now, thanks to you. Is that why you did it? Because you knew that meeting my daughter would convince Mae to accept the Culver-Blaese gene therapy?"

Khan shook her head. "No. I never even thought of that."

"Then, why?"

"Sometimes," said Khan, looking back into the room where the young

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girl and the old girl taught each other songs. "Sometimes, there are other medicines, for other kinds of hurts."

I seek no more the fine and gay,
For each does but remind me
How swift the hours did pass away
With the girl I left behind me.

They are all gone now. All gone. Mae, Dee-dee, all of them. Consuela was first. Brenda's partnership arrangement with FitzPatrick—telecommuting, they called it—left no place for her at the house. She came to visit Dee-dee, and she and Brenda often met for coffee—what they talked about I do not know—but she stopped coming after Dee-dee passed on and I have not seen her in years.

Brenda, too. She lives in LA, now. I visit her when I'm on the Coast and we go out together, and catch dinner or a show. But she can't look at me without thinking of *her;* and neither can I, and sometimes, that becomes too much.

There was no bitterness in the divorce. There was no bitterness left in either of us. But Dee-dee's illness had been a fault line splitting the earth. A chasm had run through our lives, and we jumped out of its way, but Brenda to one side and I, to the other. When Dee-dee was gone, there was no bridge across it and we found that we shared nothing between us but a void.

The operation bought Mae six months. Six months of silence in her mind before the stroke took her. She complained a little, now and then, about her quickly evaporating memories; but sometimes I read to her from my notes, or played the tape recorder, and that made her feel a little better. When she heard about seeing Lincoln on the White House lawn, she just shook her head and said, "Isn't that a wonder?" The last time I saw Mae Holloway, she was fumbling after some elusive memory of her Mister that kept slipping like water through the fingers of her mind, when she suddenly brightened, looked at me, and smiled. "They're all a-waiting," she whispered, and then all the lights went out.

And Dee-dee.

Dee-dee.

Still, after all these years, I cannot talk about my little girl.

They call it the Deirdre-Holloway treatment. I insisted on that. It came too late for her, but maybe there are a few thousand fewer children who die now each year because of it. Sometimes I think it was worth it. Sometimes I wonder selfishly why it could not have come earlier. I wonder if there wasn't something I could have done differently that would have brought us home sooner.

Singer found the key; or Peeler did, or they found it together. Three years later, thank God. Had the breakthrough followed too soon on Deirdre's death, I could not have borne it. The income from the book funded it and it took every penny, but I feel no poorer for it.

It's a mutation, Peeler told me, that codes for an enzyme that retards catabolism. In males, the gene's expression is suppressed by testosterone. In females, there's a sudden acceleration

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of fetal development in the last months of pregnancy that almost always kills the mother, and often the child as well. After birth, aging slows quickly until it nearly stops at puberty. It only resumes after menopause. Generations of gene-spliced lab mice lived and died to establish that. Sweet Annie's dear, dead child would have been programmed for the same long future had she lived.

Is the line extinct now? Or does the gene linger out there, carried safely by males waiting unwittingly to kill their mates with daughters?

I don't know. I never found another like Mae, despite my years of practice in geriatrics.

When I retired from the Home, the residents gave me a party, though none of them were of that original group—Jimmy, Rose, Leo, Old Man Morton. . . . By then I had seen them all through their final passage. When the residents began approaching my own age, I knew it was time to take down my shingle.

I find myself thinking more and more about the past these days. About Mae and the Home and Khan—I heard from my neighbor's boy that she is still in practice, in pediatrics now. Sometimes, I think of my own parents and the old river town where I grew up. The old cliffside stairs. Hiking down along the creek. Hasbrouk's grocery down on the corner.

The memories are dim and faded, brittle with time.

And I don't remember the music, at all. My memories are silent, like an old Chaplin film. I've had my house wired, and tapes play continually, but it isn't the same. The melodies do not come from within; they do not come from the heart.

They tell me I have a tumor in my left temporal lobe, and it's growing. It may be operable. It may not be. Wing wants to try Culver-Blaese, but I won't let him. I keep hoping.

I want to remember. I want to remember Mae. Yes, and Consuela and Brenda, too. And Dee-dee most of all. I want to remember them all. I want to hear them singing. ■

I am supposing, or perhaps only hoping, that our future may be found in the past's fugitive moments of compassion rather than in its solid centuries of warfare.

A People's History of the United States
Howard Zinn

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Probability Zero

CREATION MYTHS OF THE RECENTLY EXTINCT

Frederik Pohl

When the check team for the Gerat Galactics got within sensor range of their new colony site the captain summoned them to the ship's centrum. They came reluctantly. Although they had each spent as much time as possible in their own quarters—sleeping, sulking, working on their own projects or merely hiding from the rest—the interminable flight had made them thoroughly sick of each others' presence.

Still, at first, they were delighted with what the sensors revealed. The little blue planet was right where the original surveyors had reported it, sixty-odd million years before . . . but then details began to emerge.

"Oh, yuck," cried the captain, writhing in revulsion. "We're in trouble here! The place is *infested*. It's got *living things* all over it again."

That was the worst of news. The Great Galactics didn't care to share the planets they inhabited with any kind of living things but themselves. The deputy moaned, "What are we going to do now?"

The captain gave him a brief stare of contempt. "Think it through," he ordered. "As I see it, we have two options. We can go back to Galactic Central and report failure. Or we can clean it up some way or another. Which would you prefer?" The collective shudder was answer enough. "Right, then. How do we go about the clean-up?"

There was silence for a moment,

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until the political representative offered, "We could tickle the star until it went nova and burned the planet clean."

"With our budget? Get real."

"Or we could dump a big asteroid on it and kill everything off that way," the deputy captain said hopefully.

"The survey team tried that sixty-five million years ago, and all they did was get rid of the big scaly things with the sharp teeth. No, we need something *thorough* and *cheap*. Anybody else got any ideas?"

There was silence for a moment, and then the most junior member of the expedition raised his feeler. "You know I've been working in my shop to pass the time," he said diffidently. "Well, I've come up with a little invention that might help us out here. I call it a 'Black Monolith.' "

"We don't have time for your silly contraptions," the captain said menacingly.

The junior shivered, but stuck to his guns. "I think it might do the trick," he insisted. "This Black Monolith thing of mine is an intelligence stimulator. What we do with it, we set it down among those little furry things down there—" he meant the australopithecines, but that word had not been invented—"and it will teach them to use sticks and bones and things to hit other things. That's to say, they'll learn to use *tools*. And then that would mean that they'd need to use their 'hands,' as I call them, in more complicated and subtle ways, which would mean that before long they'd develop a more complex nervous system in their 'hands' and 'arms'—and, ultimately, even a more elaborate *central* nervous system in their 'brains.' Do you see what that means? Those little animals could evolve toward intelligence."

"By the Great Blast," the captain swore, "what's got into you? Vermin are bad enough, but do you think the Great Galactics will sit still for *intelligent* vermin?"

"No, I think it would really work out," the junior said, growing braver. "See, once the Monolith taught them to use tools in the first place they wouldn't stop there. They'd go right on inventing more tools, of all different kinds—simple things like wheels and levers at first, but then they'd go on to much more complicated ones. Before you know it they'd start making machines, and discovering chemistry, and inventing vehicles; why, in a million revolutions of this planet or so—long before the first colony gets here from Galactic Central—there'd be billions of them."

"And then?"

"Well, then, what comes with all that kind of primitive industrialization? You know the answer to that as well as I do: Pollution! Ecological destruction! Trust me, Captain. All we have to do is get them started, and those little creatures'll have the planet scorched sterile in no time!" ■

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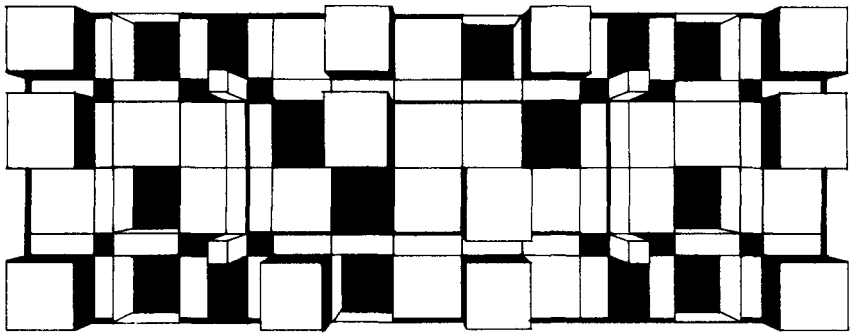

Ian Stewart

THE REAL PHYSICS OF TIME TRAVEL

There is no difference between Time and any other of the three dimensions of Space except that our consciousness moves along it.

H. G. WELLS, *The Time Machine.*

Is time travel physically possible?

Yes, it is; and to prove it, I will demonstrate my own private time machine. It's not as pretty as the Time Traveller's, but this *is* the end of the twentieth and nowadays products are always engineered down to reduce production costs. [*Takes out used catfood box with plastic lever and two tags marked + and −. Pushes lever to +.*] I hope this article hasn't been too technical, and that it has an-

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swered all your questions about the real physics of time travel. Thank you for your patience.

Oh.

[*Pushes lever to* −.]

Is time travel physically possible?

Yes, it is; and to prove it, I will demonstrate my own private time machine. [*Produces small box with . . .*

Woops, overdone it. [*Pushes lever a little towards* +. *Taps a few word processor keys experimentally. Smiles.*] That's better. You can run into a lot of problems if you mess around with time travel.

Let me start again.

Time travel used to be just science fiction. When H. G. Wells published *The Time Machine* in the 1894-5 issue of *The New Review*, even the Time Traveller's friends didn't believe a word. But if you look through today's mainstream physics journals, things like *Annals of Physics* and *Physical Review Letters*, you will find occasional articles about time travel—taking it completely seriously, and applying state-of-the-art physics. There's been quite a spate of them in recent years. Some claim to prove that time travel is impossible, and some say that it's possible in principle but impossible in practice because of the huge energy overloads; but the encouraging point is that whatever the articles say, they're becoming a lot more frequent.

Maybe somebody's trying to tell us something.

Most of The Real Physics of Time Travel is General Relativity; and the rest is Quantum Mechanics. The General Relativity is by far the most interesting, so I'll concentrate on that.

But first:

Special Relativity

I'll try to get through this bit quickly, but we need some of the basics.

The main one is that "Relativity" is a silly name.

The whole point of Special Relativity is *not* that "everything is relative," but that one particular thing—the speed of light—is unexpectedly *absolute*. If you're travelling in a car at 50 mph and you fire a gun forwards, so that the bullet moves at 500 mph relative to the car, then it will hit a stationary target at a speed of 550 mph, adding the two components. However, if instead of firing a gun you switch on a flash light which "fires" light at a speed of 670,647,740 mph (186,000 mps), then that light will not hit the stationary target at a speed of 670,647,790 mph. It will hit it at 670,647,740 mph, exactly the same speed that it would have if the car had been stationary.

You can prove this in your own home. You'll need a cardboard box about the size of a shoebox, a flash light, and a mirror. Cut a small hole in the front of the box, to let the light in. Cut a flap in the top so that you can open the box and look inside; and write "THE SPEED OF LIGHT IS 670,647,740 MPH" on the bottom of the inside of the box. Stand still, close the flap, aim the flash light at the mirror so that the beam reflects back into the box through the hole, and open the flap to read off the speed of light. Then *run towards the mirror* and repeat

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the experiment. Funny, you get 670,647,740 mph both times. . . .

You may think this is a silly experiment; but with more sophisticated equipment *you get the same answer*—as Albert Michelson and Edward Morley discovered between 1881 and 1894. They were trying to detect the motion of the Earth relative to the "ether," an all-pervading fluid that was thought to transmit all electromagnetic radiation, light included. Their conclusion was that either there isn't an ether at all, or the Earth *isn't* moving relative to it —which is fishy given its orbit round the Sun, which points it in opposite directions every six months —or that there's something pretty weird about light.

Albert Einstein is generally credited with the theory—known as Special Relativity—that there's something pretty weird about light. He published it in 1905 along with the first serious evidence for quantum mechanics and a general theory of diffusion processes. (He had a good year.) But a lot of other people—among them Hendrik Lorentz and Henri Poincaré—were working on the same idea, because it was widely recognized that Maxwell's equations for electromagnetism didn't entirely gell with Newtonian mechanics. The problem was one of "moving frames of reference." How do the equations change when the observer is moving? There are formulas that answer this question, known as coordinate transformations. In Newtonian mechanics, for example, velocities measured by (or relative to) a moving observer change by subtracting the motion of the observer. But Newtonian transformations mess up Maxwell's equations something chronic. The answer is to use different formulas, called Lorentz transformations. They keep the speed of light constant, but have spin-off effects on space, time, and mass. Objects shrink as they approach the speed of light, time slows down to a crawl, and mass becomes infinite.

It's not easy to think about this kind of thing using just the formulas, and the idea didn't really take off until 1908 when the mathematician Hermann Minkowski provided a good geometric model for relativity—a simple way to *visualize* it—now called Minkowski (or *flat*) spacetime.

Because relativity is about the nonrelative behavior of light, everything in it depends heavily upon which "frame of reference" an observer is employing. Moving and static observers see the same events in different ways. Mathematically, a frame of reference is a coordinate system. Newtonian physics provides space with three fixed coordinates (x,y,z). The structure of space was thought to be independent of time, and it was not traditional to represent time as a coordinate at all. Minkowski introduced time as an explicit extra coordinate. We can draw two-dimensional Minkowski spacetime as a plane (**Fig. 1a**). The horizontal coordinate, x, determines a particle's position in space; the vertical coordinate, t, determines its position in time. In full-blooded Minkowski spacetime x is

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three-dimensional; but for convenience it's shown here as being one-dimensional. Later I'll also represent space as being two-dimensional. The problem is that four dimensions of spacetime don't fit conveniently on to two-dimensional paper, so a lot of the mathematics involves tricks for cutting down the number of dimensions of space. The simplest trick is to ignore a few dimensions.

As the particle moves, it traces out a curve in space-time called its *world-line*. If the velocity is constant, then the world-line is straight, and its slope depends on the speed. Particles that move very slowly cover a small amount of space in a lot of time, so their world-lines are close to the vertical; particles that move very fast cover a lot of space in very little time, so their world-lines are nearly horizontal. In between, at an angle of 45°, are the world-lines of particles that cover a given amount of space in the same amount of time—measured in the right units. Those units are chosen to correspond via the speed of

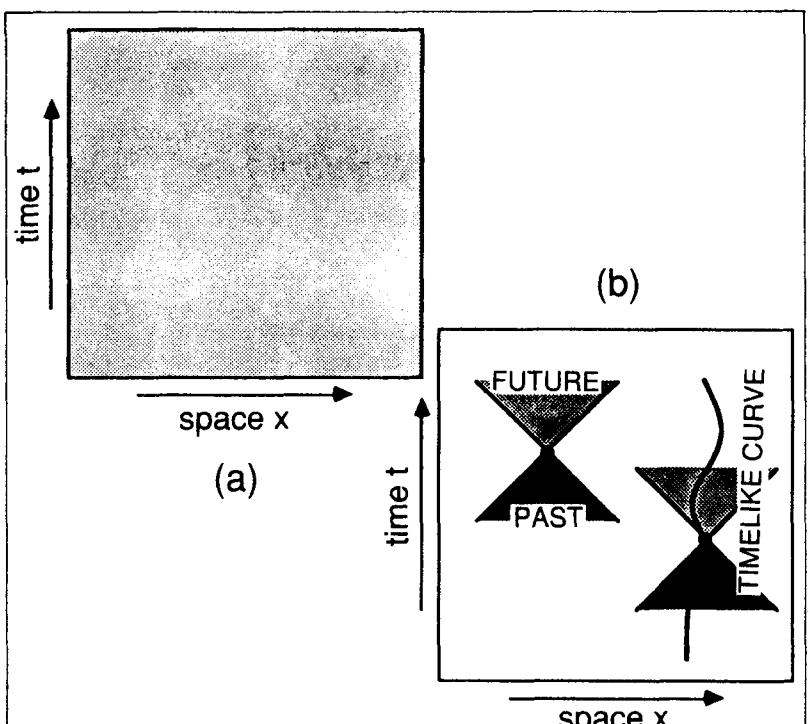

Figure 1: Minkowski spacetime.

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light—say years for time and light-years for space. What covers one light-year of space in one year of time? Light, of course. So 45° world-lines correspond to particles of light—light rays of photons—or anything else that can move at the same speed.

You all know that Relativity forbids bodies that move faster than light. (The mathematical reason is that their lengths would beocme imaginary—involving the number $i = \sqrt{-1}$—as would masses and the local passage of time.) So the world-line of a real particle can never slope more than 45° away from the vertical. Such a world-line is called a *timelike curve* (**Fig. 1b**). Any event—point in space-time—has associated with it a *light cone*, formed by the two diagonal lines at 45° inclinations that pass through it. It's called a cone because when space has two dimensions, the corresponding surface really is a (double) cone. The forward region contains the *future* of the event, all the points in space-time that it could possibly influence; the backward region is its *past*, the events that could possibly influence *it*. Everything else is forbidden territory, elsewheres and elsewhens that have no possible causal connections with the chosen event.

Pythagoras's Theorem tells us that in ordinary space, the distance between two points with coordinates (x,y,z) and (X,Y,Z) is the square root of the quantity

$$(x\text{-}X)^2 + (y\text{-}Y)^2 + (z\text{-}Z)^2 \quad (1)$$

In Special Relativity, there is an analogous quantity, called the *interval* between events (x,t) and (X,T); it is

$$(x\text{-}X)^2 - (t\text{-}T)^2 \quad (2)$$

Note the minus sign: time is special. (And H. G. Wells turns out not to be quite correct!) Along the lines of 45° slope, the interval is *zero*.

The interval is related to the apparent rate of passage of time for a moving observer. The faster an object moves, the slower time on it appears to pass. This effect is called *time dilation*. As you approach a null curve—that is, travel closer and closer to the speed of light—the passage of time that you experience slows down towards zero. If you could travel *at* the speed of light, time would be frozen. No time passes on a photon.

The key to relativistic time travel is the hoary old *twin paradox*[1], pointed out by Paul Langevin in 1911. Suppose that (**Fig. 2**) two twins, Rosencrantz and Guildenstern, are born on Earth. Rosencrantz stays there all his life, while Guildenstern travels away at nearly light-speed, and then turns around and comes home again at the same speed. Because of time dilation, only six years (say) have passed in Guildenstern's frame of reference, whereas 40 years have passed in Rosencrantz's frame. Experiments carting atomic clocks around the Earth on jumbo jets have verified this scenario, but aircraft are so slow com-

[1]Although this is called a paradox, it isn't! People think it's paradoxical because they don't actually look at a spacetime diagram, and they assume that it doesn't matter which twin is used as the 'fixed' frame. But Guildenstern's motion involves acceleration (positive and negative), while Rosencrantz's doesn't—and that destroys the apparent symmetry between the two twins.

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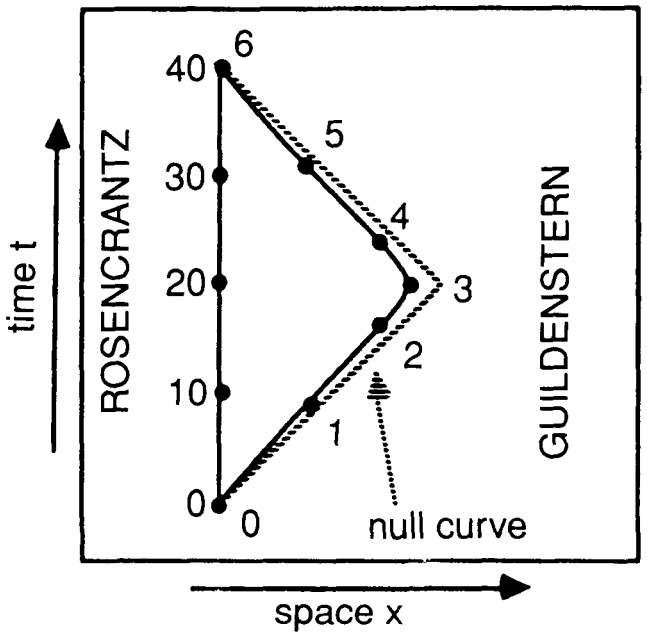

Figure 2: The twin paradox.

pared to light that the time difference observed (and predicted) is only the tiniest fraction of a second.

"The time is out of joint," as Shakespeare said in *Hamlet*. So it ought to be possible to exploit the out-of-jointness to make a time machine. But how? The missing ingredient turns out to be . . . gravity.

General Relativity

Einstein invented General Relativity as a synthesis of Newtonian gravitation and Special Relativity. In Newton's view, gravity is a force that moves particles away from the perfect straight line paths that they would otherwise follow. These paths are *geodesics*: they minimize the total distance. In flat Minkowski spacetime, the analogous objects minimize the interval (formula 2 above) instead. Gravity is incorporated, not as an extra force, but as a distortion of the structure of spacetime, which

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changes the interval. This variable interval between nearby events is called the *metric* of spacetime. The usual image is to say that spacetime becomes "curved," though this term is easily misinterpreted. In particular, it doesn't have to be curved *round* anything else. The curvature is interpreted physically as the force of gravity, and it causes light-cones to deform. One result is "gravitational lensing," the bending of light by massive objects, which Einstein discovered in 1911 and published in 1915. The effect was first observed during an eclipse of the Sun. More recently it has been discovered that some distant quasars produce multiple images in telescopes because their light is lensed by an intervening galaxy.

Fig. 3 shows a spacelike section of spacetime (that is, one taken at a "fixed" instant of time) near a star: it takes the form of a curved surface that bends downwards to create a circular valley in which the star sits. This spacetime structure is *static*: it remains exactly the same as time passes. Light follows geodesics across the surface, and is "pulled down" into the hole, because that path provides a short cut. Particles moving in spacetime at sublight speeds behave in the same way. If you look down on this picture from above you see that the particles no longer follow straight lines, but are "pulled towards" the star, whence the Newtonian picture of a gravitational force.

Far from the star, this spacetime is very close indeed to Minkowski spacetime; that is, the gravitational effect falls off rapidly and soon becomes negligible. Spacetimes that look like Minkowski spacetime at large distances are said to be *asymptotically flat*. Remember that term: it's important for making time machines. Most of our own Universe is asymptotically flat, because massive bodies such as stars are scattered very thinly.

When setting up a spacetime, you can't just bend things any way you like. The metric must obey the *Einstein equations*, which relate the motion of freely moving particles to the degree of distortion away from "flat" Minkowski spacetime.

I can now explain what a time machine looks like within the framework of General Relativity. A time machine lets a particle or object return to its own past, so its world-line, a timelike curve, must close into a loop. A time machine is just a *closed timelike curve*, abbreviated to CTC. Instead of asking "is time travel possible?" we ask "can CTCs exist?"

In flat Minkowski spacetime, they can't. Forward and backward light cones—the future and past of an event—never intersect. But they can intersect in other types of spacetime. The simplest example takes Minkowski spacetime and "rolls it up" into a cylinder (**Fig. 4**). Then the time coordinate becomes cyclic, as in Hindu mythology.

Although this *picture* looks curved, actually the corresponding spacetime is *not* curved—not in the gravitational sense. When you roll up a sheet of paper into a cylinder, it doesn't *distort*. You can flatten it out again and

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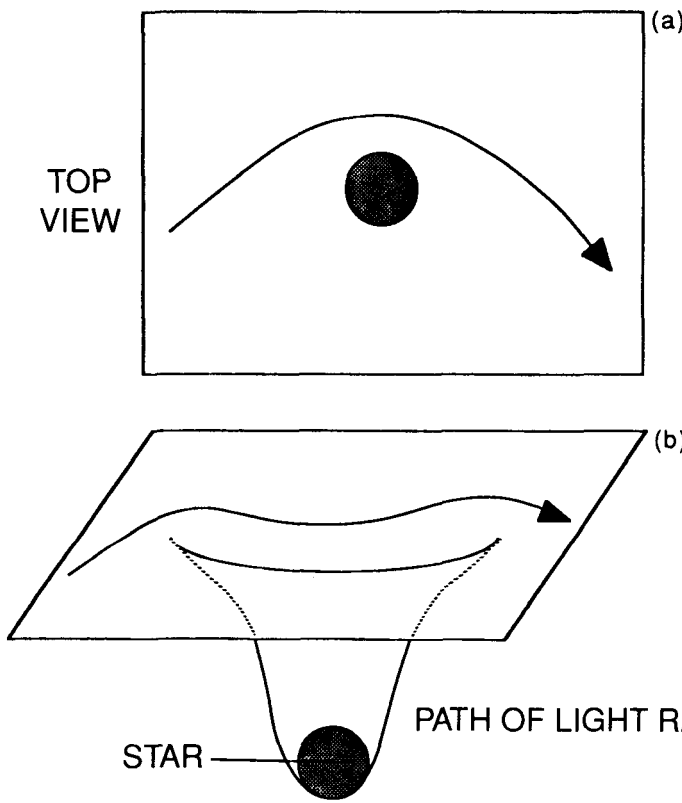

Figure 3: Bending of light by gravity.

the paper is not folded or wrinkled. An ant that is confined purely to the surface won't notice that it has been bent, because distances *on* the surface haven't changed. In short the metric—a local property of spacetime structure *near* a given event—doesn't change. What changes is the global geometry of spacetime, its overall *topology*.

Rolling up Minkowski spacetime is an example of a powerful mathemati-

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cal trick for building new spacetimes out of old ones: cut-and-paste. If you can cut pieces out of known spacetimes, and glue them together without distorting their metrics, then the result is also a possible spacetime. I say "distorting the metric" rather than "bending," for exactly the reason that I say that rolled-up Minkowski spacetime is *not* curved. I'm talking about intrinsic curvature, as experienced by a creature that lives in the spacetime; not about apparent curvature as seen in some external representation. In the rest of this article I'll say that apparent bending is "harmless" if it doesn't actually change the metric. We'll see other examples of the cut-and-paste construction as we proceed.

The rolled up version of Minkowski spacetime is a very simple way to prove that spacetimes that obey the Einstein equations can possess CTCs—and thus that time travel is not inconsistent with currently known physics. But that doesn't imply that time-travel is *possible*. There is a very important distinction between what is mathematically possible and what is physically feasible.

A spacetime is mathematically possible if it obeys the Einstein equations. It is physically feasible if it can exist, or could be created, as part of our own Universe. There's no very

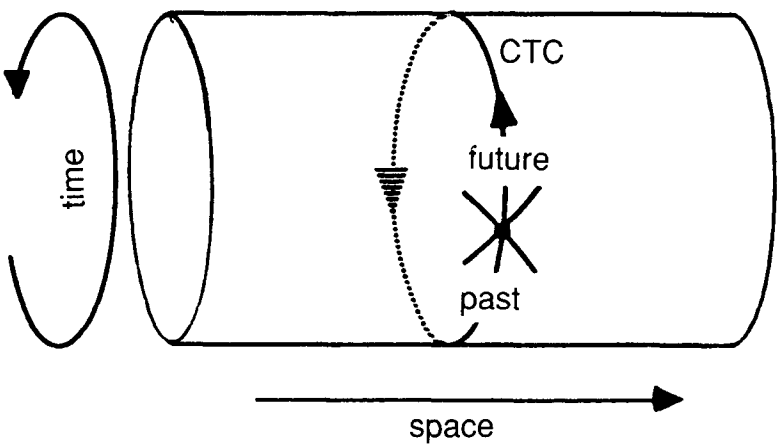

Figure 4: A simple example of a spacetime with a CTC.

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good reason to suppose that rolled-up Minkowski spacetime is physically feasible: certainly it would be hard to refashion the Universe in that form if it wasn't already endowed with cyclic time, and right now very few people think that it is. The search for spacetimes that possess CTCs *and* have plausible physics is a search for more plausible topologies. There are many mathematically possible topologies, but—as with the Irishman giving directions—you can't get to all of them from here.

Black Holes

But you can get to some remarkably interesting ones.

In classical Newtonian mechanics, there is no limit to the speed of a moving object. Particles can escape from an attracting mass, however strong its gravitational field, by moving faster than the appropriate escape velocity. In an article presented to the Royal Society in 1783, John Michell observed that this idea, combined with that of a finite velocity for light, implies that sufficiently massive objects cannot emit light at all—because the speed of light will be lower than the escape velocity. In 1796 Pierre Simon de Laplace repeated these observations in his *Exposition of the System of the World.* Both of them imagined that the Universe might be littered with huge bodies, bigger than stars, but totally dark.

They were a century ahead of their time.

In 1915 Karl Schwarzschild took the first step towards answering the analogous question within the context of General Relativity, when he solved the Einstein equations for the gravitational field around a massive sphere in a vacuum. His solution behaved very strangely at a critical distance from the center of the sphere, now called the *Schwarzschild radius.* It is equal to $2GM/c^2$ where G is the gravitational constant, M the mass of the sphere, and c the speed of light. When it was discovered, its mathematical significance seemed to be that space and time lost their identity in Schwarzschild's solution, and became meaningless. However, the Schwarzschild radius for the Sun's mass is 2km, and for the Earth 1 cm—buried inaccessibly deep. What would happen to a star that was so dense that it lay inside its own Schwarzschild radius?

In 1939 Robert Oppenheimer and Hartland Snyder showed that it would collapse under its own gravitational attraction. Indeed a whole portion of spacetime would collapse to form a region from which no matter, not even light, could escape. This was the birth of an exciting new physical concept. In 1967 John Archibald Wheeler coined the term *black hole,* and the new concept was christened. A curious postscript is that in 1950 David Finkelstein resolved the mathematical question: the loss of spacetime identity in Schwarzschild's original solution is just an artifact of a poor choice of coordinates. But even using a good choice, there is still something very weird about the Schwarzschild radius, Oppenheimer and Snyder's newborn concept remains valid.

The development over time of a

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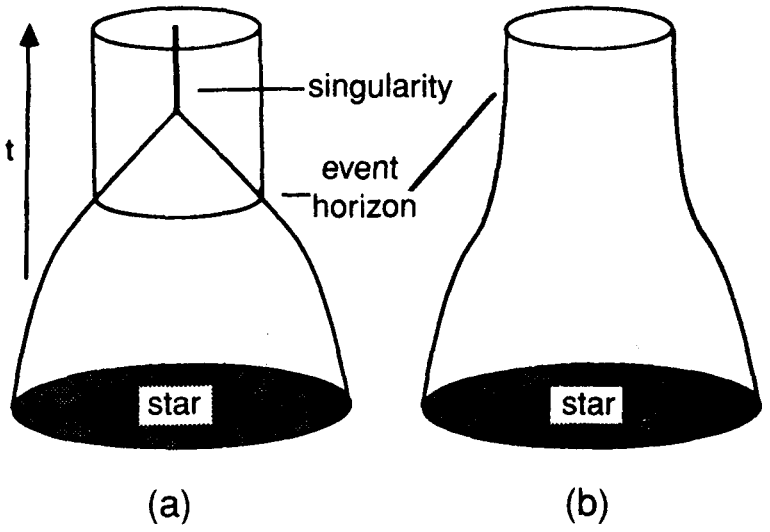

Figure 5: Formation of a black hole as seen by (a) an observer at the surface of the collapsing mass and (b) an external observer.

static—non-rotating—black hole is shown in **Fig. 5**, in which space is represented as two-dimensional and time runs vertically from bottom to top. An initial radially symmetric distribution of matter (the shaded circle) shrinks to the Schwarzschild radius, and then continues to shrink until, after a finite time, all the mass has collapsed to a single point, the singularity. From outside, all that can be detected is the *event horizon* at the Schwarzschild radius, which separates the region from which light can escape from the region that is forever unobservable from outside. Inside the event horizon lurks the black hole.

Fig. 5a is the sequence of events seen by a hypothetical observer on the surface of the star, and the time coordinate *t* is the one experienced by such an observer. If you were to watch the collapse from outside you would see the star shrinking, towards the Schwarzschild radius, but you'd never see it get there. As it shrinks, its speed of collapse as seen from outside approaches that of light, and relativistic time-dilation implies that the

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entire collapse takes infinitely long when seen by an outside observer, as in **Fig. 5b**. However, you'd see the light emitted by the star shifting deeper and deeper into the red end of the spectrum. Inside a black hole, the roles of space and time are reversed. Just as time inexorably increases in the outside world, so space inexorably decreases inside a black hole.

Because the spacetime topology of a black hole is asymptotically flat—like Minkowski spacetime at large distances—it can be cut-and-pasted into the spacetime of any universe that has reasonably large asymptotically flat regions—such as our own. This makes black hole topology physically plausible in our Universe. Indeed, the scenario of gravitational collapse makes it even more plausible: you just have to start with a big enough concentration of matter, such as a neutron star or the center of a galaxy. A technologically advanced society could *build* black holes.

A static black hole doesn't possess CTCs, though, so we haven't achieved time travel yet. However, we're getting close. The key is the realization that Einstein's equations are time-reversible: to every solution there corresponds another that is just the same, except that time runs backwards. The time-reversal of a black hole is a *white hole*, and it looks like Fig. 5 turned upside down. An ordinary event horizon is a barrier from which no particle can escape; a time-reversed horizon is one into which no particle can fall, but from which particles may from time to time be emitted. So, seen from the outside, a white hole would appear as the sudden explosion of a star's worth of matter, coming from a time-reversed event horizon.

White holes may seem rather strange. It makes sense for an initial concentration of matter to collapse, if it is dense enough, and thus to form a black hole; but why should the singularity inside a white hole suddenly decide to spew forth a star, having remained unchanged since the dawn of time? Let's just agree that white holes are a mathematical possibility, and notice that they too are asymptotically flat. So if you knew how to make one, you could glue it neatly into your own universe.

Not only that: you can glue a black hole and a white hole together. Cut them along their event horizons, and paste along these two horizons. The result (more accurately, a fixed spacelike section of it) is shown in **Fig. 6**: a sort of tube. Matter can pass through the tube in one direction only: into the black hole and out of the white. It's a kind of matter-valve. The passage through the valve is achieved by following a timelike curve, because material particles can indeed traverse it.

Because the topology of Fig. 6 is asymptotically flat at both ends of the tube, both ends can be glued into any asymptotically flat region of any spacetime. You could glue one end into our Universe, and the other end into somebody else's; or you could glue both ends into ours—*anywhere*

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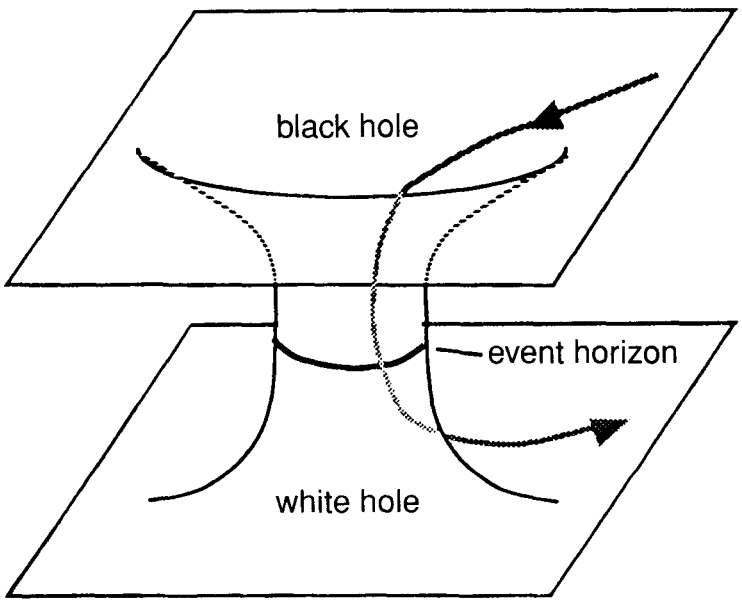

Figure 6: A wormhole.

you like (except near a concentration of matter). Now you've got a *wormhole*. I've drawn one schematically in **Fig. 7**; but you have to remember that the distance *through* the wormhole is very short, whereas that between the two openings, across normal spacetime, can be as big as you like.

A wormhole is a short cut through the Universe. But that's *matter-transmission*, not time travel. Never mind: we're nearly there.

Turning a Wormhole into a Time Machine

In 1988 Michael Morris, Kip Thorne, and Ulvi Yurtsever realized that by combining a wormhole with the twin paradox, they could get a CTC. The idea is to leave the white end of the wormhole fixed, and to

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tow the black one away (or zigzag it back and forth) at just below the speed of light.

Fig. 8 shows how this leads to time travel. The white end of the wormhole remains static, and time passes at its normal rate, shown by the numbers. The black end zig-zags to and fro at just less than the speed of light; so time-dilation comes into play, and time passes more slowly for an observer moving with that end. Think about world-lines that join the two wormholes through normal space, so that the time experienced by observers at each end are the same: lines joining dots with the same numbers. At first those lines slope less than 45°, so they are not timelike, and it is not possible for material particles to proceed along them. But at some instant, in this case time 3, the line achieves a 45° slope. After this "time barrier" is crossed, you can travel from the white end of the wormhole to the black through normal space—following a timelike curve. An example of such a world-line runs from point 5

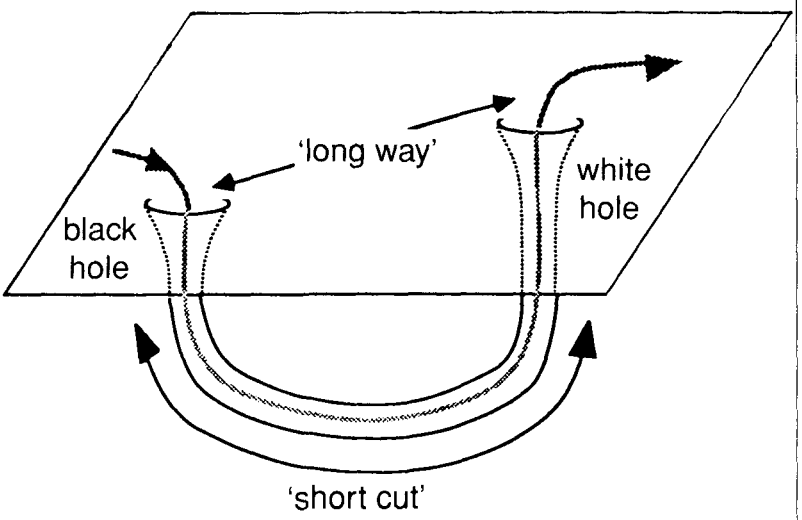

Figure 7: Using a wormhole as a matter-transmitter.

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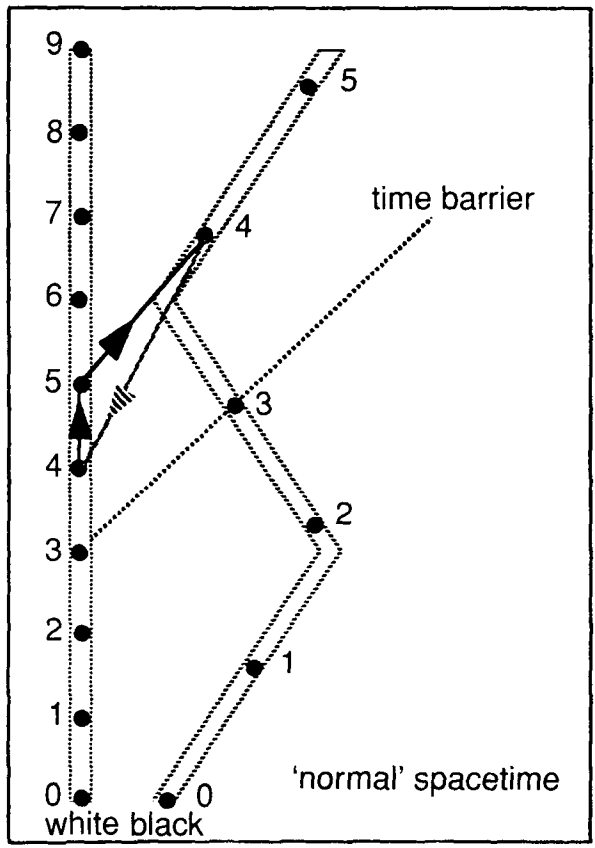

Figure 8: Turning a wormhole into a Time Machine.

in the white end of the wormhole to point 4 in the black. Once there, you can return *through* the wormhole, again along a timelike curve; and because this is a short cut you can do so in a very short period of time, effectively travelling instantly from point 4 at the black end to the corresponding point 4 at the white. This is the same place as your starting point, but one year in the *past!* You've travelled in time. By waiting one year,

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you can close the CTC and end up at the same place and time that you started from.

You can make your own wormhole in your own home. Take a plastic trash bag and cut out the bottom. Fix one end, and imagine the other rushing to and fro at just below lightspeed, so that time inside it slows down. When the far end of the bag comes near, walk across to it, arriving at some time in your own past. Climb through it, and you'll travel back in time.

If your imagination is vivid enough, that is.

The actual distance you have to travel through ordinary space need not be huge: it depends on how far the right end of the wormhole has to move on each leg of its zigzag path. In space of more than one dimension it can spiral rather than zigzag, which corresponds to making the black end following a circular orbit at close to lightspeed. You could achieve this by setting up a binary pair of black holes, rotating rapidly round a common center of gravity.

The further into the future your starting point is, the further back in time you can travel from that point. But there's one disadvantage of this method: you can never travel back past the time barrier, and that occurs some time after you build the wormholes. No hope of getting back to hunt dinosaurs.

Yes But . . .

Could you really build one of these devices? Could you really get through the wormhole? A technologically advanced civilization could build the holes, and move them around, by creating intense gravitational fields. But that's not the only obstacle.

Another is the "catflap effect": when you move a mass through a wormhole it tends to shut on your tail. It turns out that in order to get through without getting your tail trapped you have to travel faster than light, so that's no good. It's easiest to see why if we represent the spacetime geometry using a *Penrose map*. When you draw a map of the Earth on a flat sheet of paper you have to distort the coordinates—for example, lines of longitude may become curved. The Penrose map of a spacetime also distorts the coordinates; but it is designed so that light cones don't change—they still run at 45° angles. **Fig. 9** shows a Penrose map of a wormhole. Any timelike path that starts at the wormhole entrance, such as the wiggly line shown, must run into the future singularity. There's no way to get across to the exit without exceeding the speed of light.

The traditional way round this difficulty is to thread the wormhole with *exotic matter*, exerting enormous negative pressure, like a stretched spring. Matt Visser has recently suggested an alternative geometry for a benign wormhole. Two identical cubes are cut in space, and their corresponding faces are pasted together; then the edges are reinforced with exotic matter.

Rotating Black Holes

The classic answer, though, is to employ a rotating black hole.

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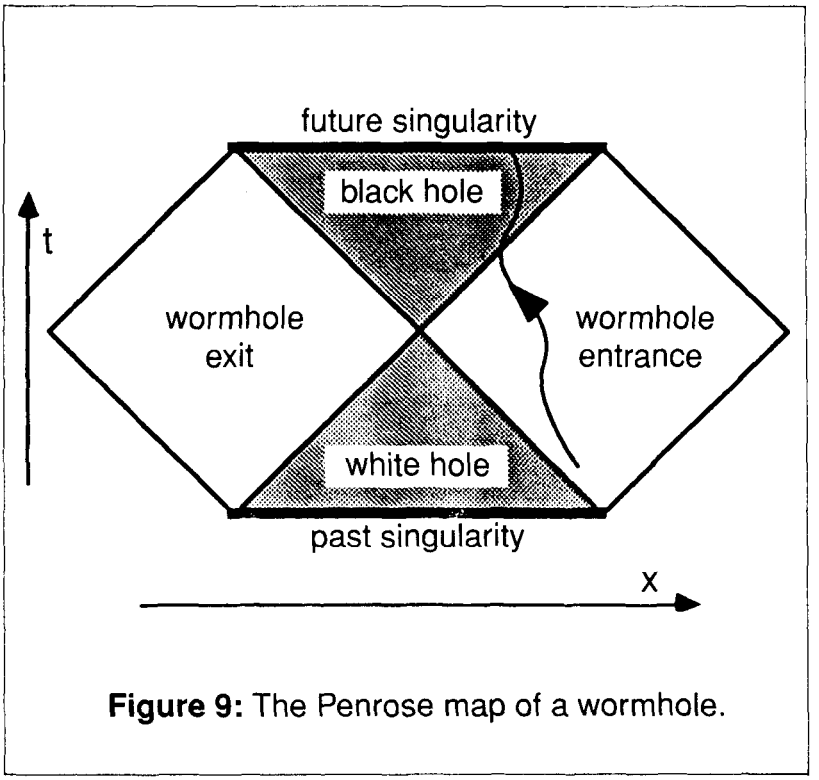

Figure 9: The Penrose map of a wormhole.

The Schwarzschild solution of Einstein's equations corresponds to a *static* black hole, one formed by the collapse of a non-rotating sphere. In 1962 Roy Kerr solved the equations for a rotating black hole **(Fig. 10)**, now known as a *Kerr black hole.* (There are two other kinds of black hole: the Reissner-Nordstrøm black hole, which is static but has electric charge, and the Kerr-Newman black hole which rotates and has electric charge.) It is almost a miracle that an explicit solution exists—and definitely a miracle that Kerr was able to find it. It's extremely complicated and not *at all* obvious. But it has spectacular consequences.

One is that there is no longer a point singularity inside the black hole. Instead, there is a circular ring singularity, in the plane of rotation. In a static black hole, all matter must fall into the singularity; but in a rotating one, it need not. It can either travel above the equatorial plane, or pass through the ring. The event hori-

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zon also becomes more complex; indeed it splits into two. Signals or matter that penetrate the *outer horizon* cannot get back out again; signals or matter emitted by the singularity itself cannot travel past the *inner horizon*. Further out still, but tangent to the outer horizon at the poles, is the *static limit*. Outside this, particles can move at will. Inside it, they must rotate in the same direction as the black hole, although they can still escape by moving radially. Between the static limit and the outer horizon is the *ergosphere*. If you fire a projectile into the ergosphere, and split it into two pieces, one being captured by the black hole and one escaping, then you can extract some of the black hole's rotational energy.

The most spectacular consequence of all, however, is the Penrose map of a Kerr black hole, shown in **Fig. 11**. The white diamonds represent as-

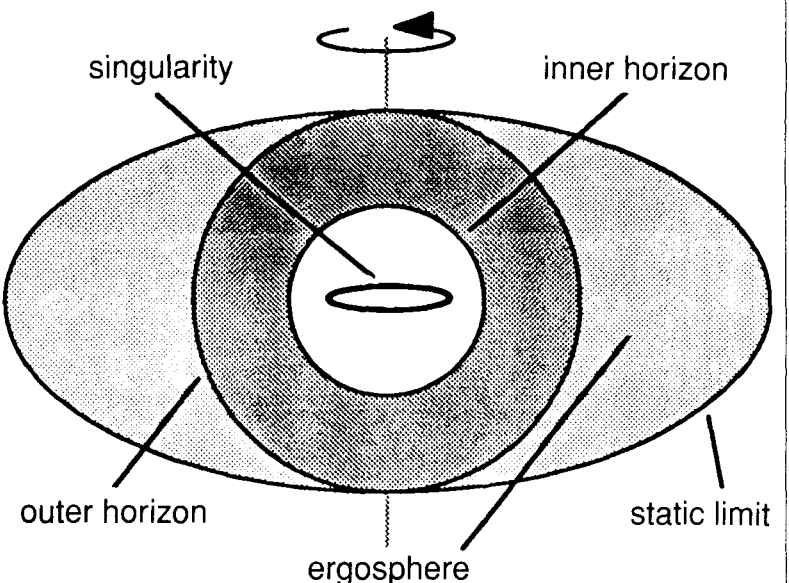

Figure 10: Structure of a rotating black hole.

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ymptotically flat regions of spacetime—one in our Universe, and several others that need not be. The singularity is shown as a system of broken lines, indicating that it is possible to pass through it (going through the ring). Beyond the singularities lie antigravity universes in which distances are negative and matter repels other matter. Any body in this region will be flung away from the singularity to infinite distances. Several legal (that is, not exceeding the speed of light) trajectories are shown as curved paths. They lead through the wormhole to any of its alternative exits. The most spectacular feature of all, is that this is only part of the full diagram. This repeats indefinitely in the vertical direction, and provides an *infinite number* of possible entrances and exits.

This ought to be the basis of a really good SF plot.

If you use a rotating black hole instead of a wormhole, and if you can find a way to tow its entrances and exits around at nearly lightspeed, you'll get a much more practical time machine—one that you can get through without running into the singularity.

Cosmic String

If you don't fancy trying to control Kerr black holes, you can settle for a much simpler kind of singularity that has only recently come into fashion: *cosmic string*. (See Vonda McIntyre's *Starfarers* series, for instance.) This is a static spacetime, so that spacelike sections remain unchanged as time passes. It is best visualized by taking two dimensions of space. Cut out a wedge-shaped sector and paste the edges together. If you do this with paper you end up with a pointed cone; but mathematically you can just identify the corresponding edges without doing any bending. The time coordinate works just as it does in Minkowski spacetime (and to get the right shape for light cones you should identify the edges without making actual cones). If you throw in a third space coordinate and repeat the same construction on every perpendicular cross-section, you get a *line* mass. This is the fully-fledged cosmic string.

To make a model of one, thread lots of identical cones on a length of—well, string. Remember, each cone is a constant-time section of the actual spacetime.

The physical interpretation of this spacetime is that the cosmic string has a mass, proportional to the angle cut out. However, it doesn't behave like an ordinary mass. Everywhere except the cone point, spacetime is locally flat—just like Minkowski spacetime. The apparent curvature of a real cone is "harmless." But the cosmic string creates global changes in the spacetime topology, affecting the large-scale structure of geodesics. For instance, matter that goes past a cosmic string is gravitationally lensed, as we'll see in more detail in a moment.

Recent surveys of the distribution of galaxies in our Universe has revealed that they clump on vast scales, forming structures hundreds of millions of light-years long. This clumpiness is too great to have been

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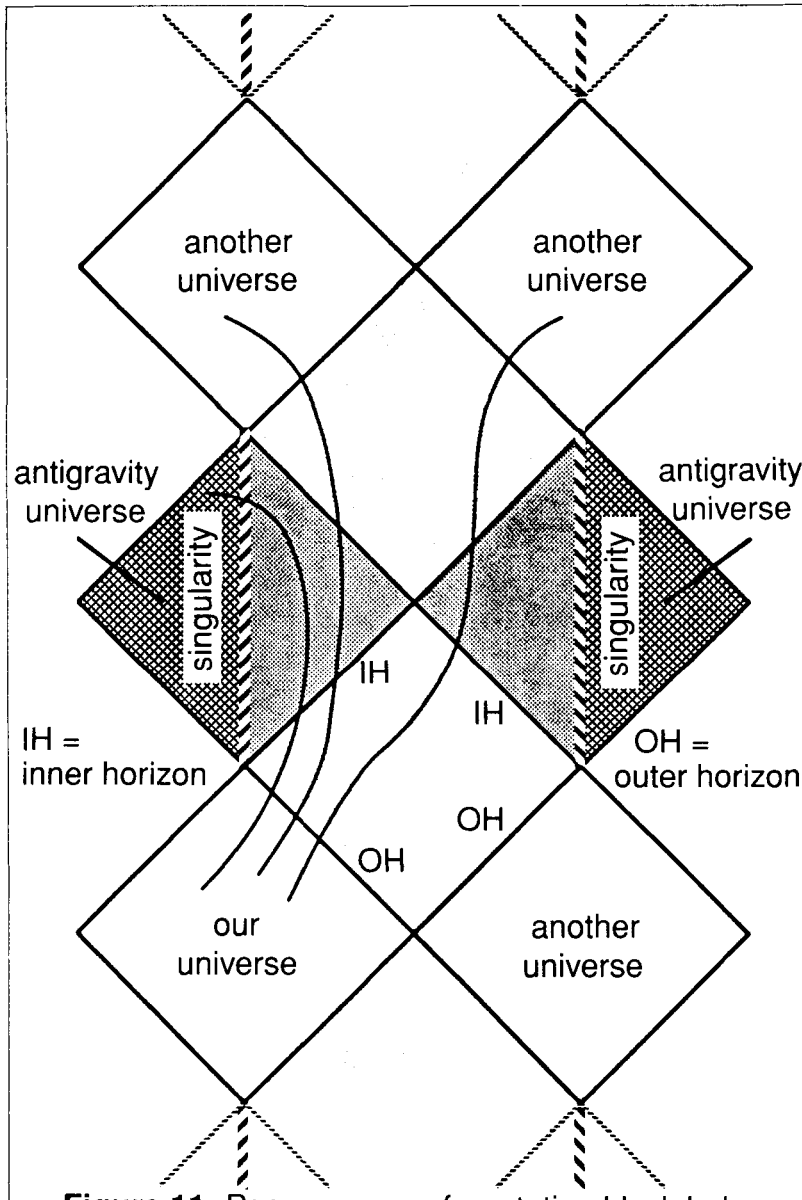

Figure 11: Penrose map of a rotating black hole.

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caused by gravitational attraction among the known matter. One theory is that the clumps were "seeded" by real cosmic strings.

A cosmic string is much like a wormhole, because the mathematical glue lets you "jump across" the sector of Minkowski spacetime that is cut out. In 1991 J. R. Gott exploited this analogy to construct a time machine: more precisely, he showed that the spacetime formed by two cosmic strings that whiz past each other at nearly light-speed contains CTCs. This was described briefly by John G. Cramer in "Neutrinos, Ripples, and Time Loops" in *Analog*, February 1993, pp. 107-111. The starting-point is two static strings, symmetrically placed, as in **Fig. 12**, which as usual is a constant-time spacelike section. The time coordinate is suppressed; but if it were added, it would run perpendicular to the page.

Because of the "gluing," points P and P′ are identical, and so are Q and Q′. The figure shows three geodesics joining two points A and B: the hori-

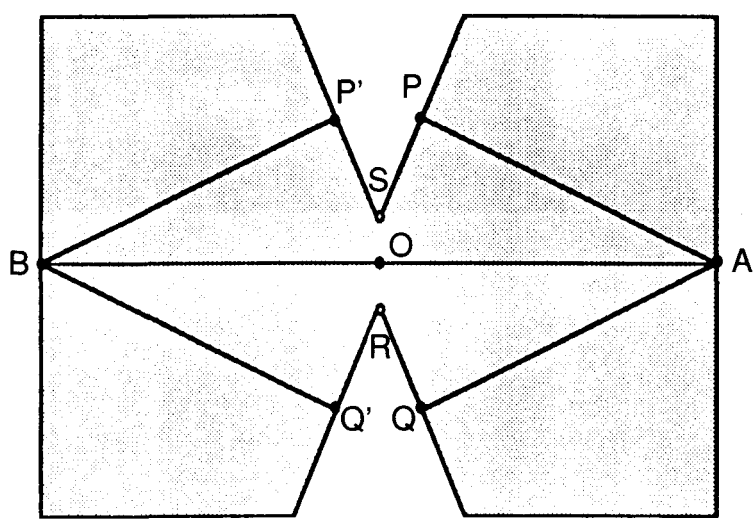

Figure 12: Two cosmic strings.

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zontal line AB, the line APP′B, and the symmetrically placed line AQQ′B. This demonstrates gravitational lensing by the cosmic strings: an observer at B would see three copies of A, one along each of these three directions.

Gott calculated that if the two cosmic strings are close enough together, then it takes light longer to traverse the path AB than to traverse the other two. This has an important consequence. If a particle starts from position A but at time T in the past, it can get to B at time T into the future. Call these events A(past) and B(future). If the strings R and S are now made to move, so that S moves rapidly to the right and R rapidly to the left, then A(past) and B(future) become simultaneous in the frame of a stationary observer (thanks to time-dilation).

To construct the required CTC, we make the particle move from A(past) to B(future) passing via PP′; then by symmetry we make it return from B(future) to A(past) via QQ′. Gott's calculations show that provided the cosmic strings travel at close to lightspeed, this CTC really does exist—mathematically.

Again the question is: can such a scenario be realized physically by a technologically advanced civilization? The answer would seem to be yes, provided of course that they have the ability to create cosmic strings, or to harness naturally occurring ones. If any natural ones exist, of course, which is moot. But in January 1992 Sean Carroll, Edward Farhi, and Alan Guth found a snag. There isn't enough available energy in the Universe to build a Gott time machine. More precisely, the Universe never contains enough matter to provide such energy from the decay products of stationary particles. So the advanced civilization would need to develop a powerful new energy source.

Quantum Bells and Whistles

If we take Quantum Mechanics into account, we can say a little more. For a start, there may be ways to create wormholes. On the very tiny length scales of Quantum Mechanics, known as the Planck length—around 10^{-33} cm—the topology of spacetime is thought to be that of a *quantum foam* (**Fig. 13**)—a perpetually changing mass of tiny wormholes. An advanced civilization might be able to use gravitational manipulators to grab a quantum wormhole and enlarge it to macroscopic size.

Quantum Mechanics also sheds light on one of the dangers of time travel, known to all devotees of SF: the "grandfather paradox," which goes back to René Barjavel's story *Le Voyageur Imprudent*. You go back in time and kill your grandfather, but because your father isn't born, neither are you, so you *can't* go back to kill him. . . . Quantum Mechanics is indeterminate—many events, such as the decay of a radioactive atom, are random. One way to make this indeterminacy mathematically respectable is the "many worlds" interpretation of H. Everett. This view of the Universe is very familiar to readers of SF: our world is just one of an infinite

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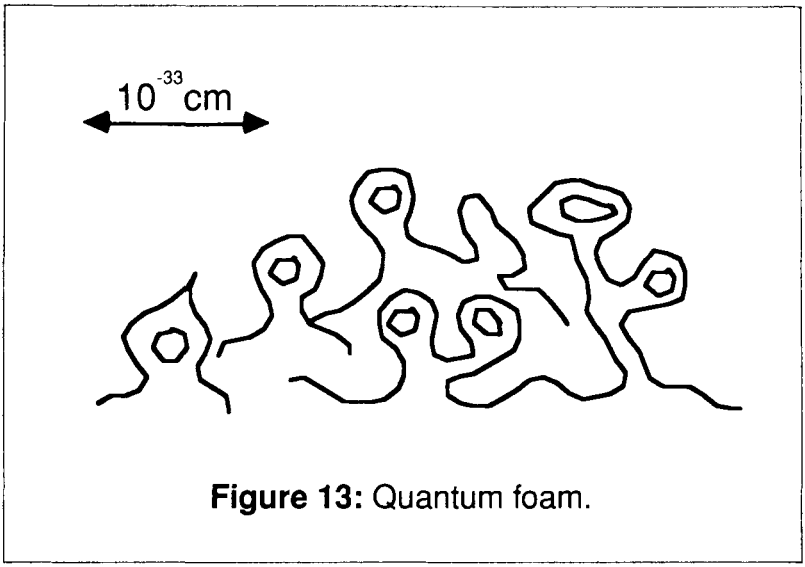

Figure 13: Quantum foam.

family of "parallel worlds" in which every combination of possibilities occurs. In 1991 David Deutsch noted that, thanks to the many worlds interpretation, quantum mechanics involves no obstacles to "free will." Moreover—another standard SF trope—the grandfather paradox ceases to be paradoxical, because grandfather will be (or will have been) killed in a parallel world, not in the original one.

In Quantum Mechanics, then, real physics has finally caught up with SF. In Relativity, the clumsy and energy-wasteful devices of real physics are a pale shadow of the elegant machine of Wells's Time Traveller, "a glittering metallic framework, scarcely larger than a small clock. Very delicately made. There was ivory in it, and some transparent crystalline substance." (Actually this is the description of a miniaturized prototype, but Wells tells us that the actual machine was much the same.)

There's still a bit of R & D to be done, I feel. ■

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ABOUT THE AUTHOR

Ian Stewart is professor of mathematics at the University of Warwick, England, where he does research on chaos theory and its applications. He has acquired a growing reputation as a science communicator, and recently became mathematics consultant to the British magazine *New Scientist*, for which he writes frequent articles. He also writes the Mathematical Recreations column of *Scientific American*; contributes to magazines such as *Discover* and *The Sciences*; and has been featured in major British newspapers including *The Times, The Guardian, The Independent*, and *The Daily Telegraph*.

He often appears on BBC radio and recently scripted and presented a prime-time program on Chaos Theory. His TV appearances include two *Nova* programs on chaos and antichaos, and *Culture Clash*, a follow-up to C.P. Snow's idea of the "two cultures" of arts and science.

He has written or co-authored over sixty books in the last twenty years. Recent books on popular science include the bestseller *Does God Play Dice?*, which has been translated into ten languages; *The Problems of Mathematics; Game, Set and Math; Another Fine Math You've Got Me Into;* and *Fearful Symmetry—is God a Geometer?* He has also written and drawn three comic books about mathematics—in French.

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He is an active member of Science Fiction and Fantasy Writers of America, and writes occasional SF short stories, the best known probably being his "Billy the Joat" stories which appeared in *Analog* in the eighties. He collects SF, plays guitar, paints in oils and acrylics, reads voraciously, and spends a lot of time keeping his cat out of the fish pond.

CHAD OLIVER
1928-1993

Symmes Chadwick Oliver, known to science fiction readers as Chad Oliver and to anthropologists as Dr. Symmes C. Oliver, died August 9, 1993, after a struggle with cancer that began in the late 1980s. Born in Cincinnatti, Ohio, he spent most of his life in Texas. With graduate degrees in both English and Anthropology, he was long a highly regarded professor of the latter at the University of Texas in Austin.

Despite a relatively small output—a handful of novels and a somewhat larger number of short stories—Oliver is generally recognized as one of the most important and influential pioneers in bringing competent anthropological thinking to the treatment of science-fictional themes. He is also fondly remembered by several young writers as an invaluable influence on their careers, and will surely be missed by all readers and writers who knew him, his work, or both.

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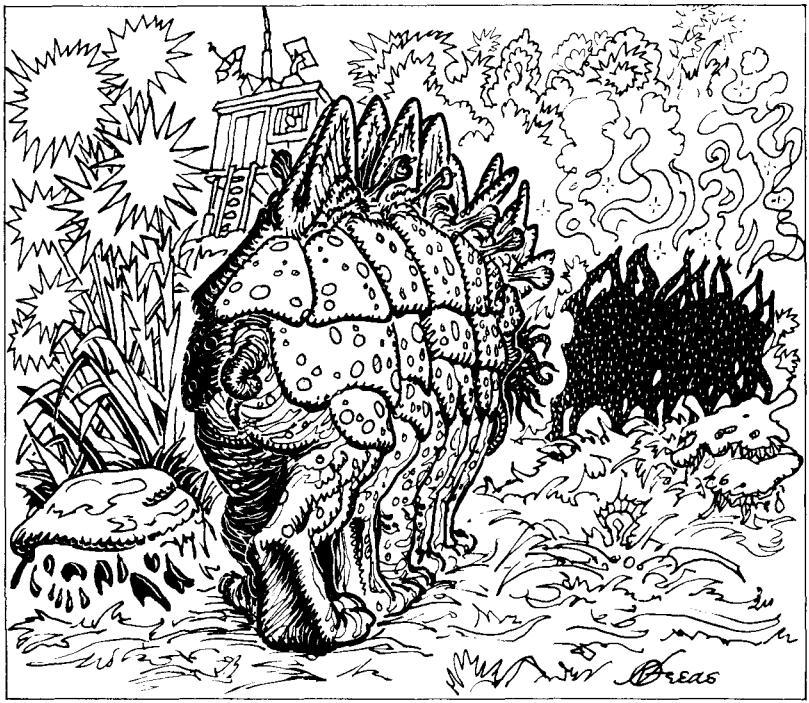

EXCERPTS FROM THE DISCUSSION OF THE CONTROLLED VIBRATION THEORY OF COMMUNICATION AMONG THE UN-KIN

Sarah Zettel & Laura Woody

Good Scientists always try to avoid approaching a problem with preconceptions—but 'tain't always easy!

Illustrations by Kelly Freas

Taken from the discussion pool housed at the Toc Kup Communication Facilitation Unit from the period between 10:20:18 to 11:06:21. Compiled by Shh Tchtik Tic, Third Depth Researcher.

* * *

10:20:18. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. I was extremely disappointed when I listened to the 10:20:17 comments made by Shh Toc Ket. I recognize that this discussion pool is for open theorizing regarding

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the Un-Kin, but I did not think that included fantasizing by freshly graduated radicals.

Admittedly, there are many things we do not know about these arrivals to our home, but there are several points on which the Kin in Science are united.

First, the Un-Kin function as an intelligence system, probably evolved from a herd or hive dwelling mammal. Seven or more group members must be in close proximity to form a sentient grouping.

Second, the Un-Kin group members communicate between themselves by use of pheromones which are modulated through their food groove.

Third, the individual Un-Kin members do not possess a mechanism that allows them to receive or transmit vibrations efficiently enough to evolve a language of sound like our own. The first day of contact, two Un-Kin members walked straight through the underbrush up to Fourth Depth Researcher Kup Tak Kic. The researcher at that time had been speaking aloud from what he had hoped was a safe distance in order to attract the Un-Kin's attention without alarming them. The Un-Kin showed no sign of having heard him calling. Instead, their reaction to him was to enlarge their food grooves and run back to the main group. Only within the group did the Un-Kin members organize an attempt at rational communication.

Despite the evidence which has convinced all the rest of the Kin in Science about the make-up of the Un-Kin intelligence system and methods of communication,"Learned Speaker" Shh Toc Ket says we are all wrong. She asserts, on the basis of no more than two unrelated observations, that the Un-Kin communicate by vibrations that they could not possibly hear or control and that group members possess sentience when operating individually.

Such speculations divide our energies and will cripple our efforts to learn the Un-Kin language before their messengers return from their home world. *Toc Toc Kup, Learned Speaker.*

10:20:19. From Shh Toc Ket, Learned Speaker. Addressing Kin of my Mind. With respect to the vehement opinions of the Learned Speaker Toc Toc Kup, the only things we can say for sure about the Un-Kin are that they are sentient and that they did not evolve on this globe. We only know the latter because of the blood and hair cultures they have generously shared with us for analysis. We might not have guessed the former if they hadn't been carrying photoelectric cells when face to face contact occurred. As for the unity of the Kin in Science, Learned Observer Ket Shh Shh has expressed doubts regarding the pheromonal communication theory. To my knowledge, she has not yet retracted those statements.

I agree that we must concentrate our efforts in order to meet the Un-Kin unencumbered and on open ground. But what's the point of pursuing a scent that is obviously so cold?

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The Un-Kin members inferred almost immediately that the physical action of clapping speech spines is how we talk. A few weeks after their arrival, they had created a crude method of reproducing the sounds of our speech (a series of drums created from metal parts scavenged from their supplies). They analyze and accurately repeat sounds presented to them. Without even resorting to their measuring and analysis aids, they can formulate a response using sound. If they are naturally deaf, as Learned Speaker Toc Toc Kup suggests, how could they learn to receive and transmit sound at all? Further, if it takes all ten of the Un-Kin who have remained with us to achieve the intellectual capacity of one Kin, how did they manage to decipher the mechanics of our language when the united efforts of the Kin in Science haven't even begun to comprehend theirs? *Shh Toc Ket, Learned Speaker.*

10:20:20. From Kup Tak Kic, Fourth Depth Researcher. Addressing Kin of my Mind. "Almost immediately" is a relative term. As the first observer of the Un-Kin group I feel obliged to strike out at this point.

During the initial contact period, the Un-Kin membership and I faced each other for days. We slowly and carefully manipulated the natural objects that were available in the clearing where they have marked their territory. Both sides tried every route available to determine that the other was capable of abstract, logical thought. If the Un-Kin members worked more feverishly than I did, I ask you to remember that the small, unarmored Un-Kin must have been highly motivated to find out whether I was interested in communication or consumption.

After each experiment they performed, the Un-Kin clustered together to share interpretations of the results and receive new assignments from the group intelligence. At no point did a single Un-Kin member initiate an experiment on its own. They marked no territory between themselves and they displayed no competition for even basic resources.

Their first attempts at establishing communication involved standing in front of me and manipulating their food grooves, dousing me with pheromones I was unable to process. They did not work out a new approach for three weeks. At that time, a set of members lined up, one behind the other, and waved their manipulative limbs over their heads. The waving limbs looked remarkably like speech spines in motion, but they did not produce any sound. As I recorded at the time, this indicates that their primary sense is that of smell, followed by sight.

During this time, I heard only random and infrequent noises from the Un-Kin. Some were physically produced by the members. Some were the result of a piece of equipment they were working with. However, these noises were so sporadic in comparison to the pheromonal changes that I had to discount them. I can state from direct experience, each Un-Kin has a distinct scent, sometimes artificially augmented or re-

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pressed. This scent changes with emotional level or even reproductive state. If the changes seem crude and slow to us, I would suggest it is because we do not possess either the proper sensory organs or the proper aids for interpreting underlying subtleties.

It was a total of ten weeks from my initial contact that the Un-Kin created their first drums, allowing a sentient group to produce sounds I could understand as speech. Although I was able to make them understand that they had found a successful means of reaching me, they were, and still are, incredibly slow to progress. All observations show the same pattern of behavior. The Un-Kin members speak using their drums and wait for the response. Response is given. The Un-Kin communicate with each other for a space of time, and then make their answer.

Third Depth Researcher Tch Tic KtchKt suggests that while the Un-Kin cannot hear vibrations as we do, their elongated, vertical, body cavities can feel the vibrations that clapping speech spines produce. They were eventually able to understand that these vibrations were the source of meaningful communication for the Kin.

We can only bristle with impatience that our technicians have been unable to come up with a way to effectively record and transmit scent. Until that time, we're oblivious to the subtleties their marvellously delicate noses ascertain. *Kup Tak Kic, Fourth Depth Researcher.*

* * *

10:20:21. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. Progress is being made in the recording and transmission process. With the recent application of the digital sampling and analysis system that chemists of the Tck Tch Shh Tic Kup family have developed, as well as the generous contributions of other direct contact researchers, I have mapped fifty-seven pheromone patterns from the Un-Kin. The number is growing by the week. With enough data we will be able to discern the grammar involved in the Un-Kin's language of scent. *Toc Toc Kup, Learned Speaker.*

11:00:00. From Learned Observer Ket Shh Shh. Addressing Kin of my Mind. Because Learned Speaker Shh Toc Ket invoked my name and reputation, I feel obligated to respond, but I am by no means elated at the prospect.

Yes, I have recorded my doubts about pheromonal communication between the Un-Kin membership. My initial argument was that scent is an inefficient mechanism for communication, particularly at a distance. Even mild wind and rain could effectively render such creatures mute, and if mute they could not function as their intelligence system requires. This does not mean I advocate either the individual intelligence theory or the controlled vibration communication theory espoused by Learned Speaker Shh Toc Ket.

These are the facts. The members of the Un-Kin group have an average cranial mass of four pounds. Our

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nearest relatives have a cranial mass of nine pounds and our own is twelve. Can we reasonably expect sentience in an individual body with one-third our cranial capacity? Further, an Un-Kin member's average body mass is one hundred and sixty pounds, less than a third of an average Kin's. In an eco-system which contained large predators, how could such tiny creatures have prevailed to become the sole sentience on their world by acting singly? It is an applicable truism that the hunted cannot rule the hunter.

Further, the Un-Kin constantly speak of themselves in terms of groups, using our words for "flock" or "herd" or "clan." They talk about "informing," "giving instructions to" and "receiving help from," the groups that make up their home environment. When questioned about why particular tasks are being performed, the answer is inevitably a variation on "We decided it would be useful to..." No recorded exchange has elicited an indication of individual member action.

We know that both herd and flock systems evolved for the protection of the majority of the members. In the initial stages of evolution between competing herds, the group that could act the fastest for the greatest benefit of its members would triumph over its competitors. This would be the same herd whose members could communicate the fastest. The selection pressure therefore, would be for rapid communication between members and decisive action to preserve the protective group structure and therefore the life of the individual. It may be that the combination of evolutionary pressures and societal teachings have rendered the Un-Kin incapable of producing the idea of acting singly for an extended period, even though they are physically capable of it. This theory does appear to lend credence to the pheromonal communication theory, but I remain skeptical that pheromones alone could evolve into an effective communication system, even for a herd. I think perhaps we are overlooking something.

What is most frustrating is that the ones capable of answering this riddle are at the tips of our tendrils, and yet we cannot understand them. The Un-Kin are studying us as intently as we are studying them, but while they can understand and process the words for observable objects or simple equations, our physiologies are so different (two manipulative limbs as opposed to one, vertical orientation as opposed to horizontal) that terms for biological actions, such as "talk" are extremely difficult to convey. *Ket Shh Shh, Learned Observer.*

11:00:01. From Kup Tak Kic, Fourth Depth Researcher. Addressing Kin of my Mind. I have noticed that serious discussion of Learned Speaker Shh Toc Ket's controlled vibration and individual intelligence theories is taking place in other pools. This could eventually divide contracted observers and researchers and leave us still at a disadvantage when the Un-Kin messengers return.

Let's look to the Un-Kin for solu-

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tions. First, each Un-Kin member has evolved with a pair of primary manipulative limbs that are well removed from their three short proboscises. Three, you will notice, not one. One between their eyes and food grooves and one on each side of their eyes, allowing for directional differentiation. This indicates a degree of specialization in their noses that Kin do not possess. The proboscises are very close to the food groove, which is the primary producer of Un-Kin pheromones, much as our ears are located between our speech spines. This close orientation of scent production and scent reception shows how important the scents must be for communication. *Kup Tak Kic, Fourth Depth Researcher.*

11:00:02 From Shh Toc Ket, Learned Speaker. Addressing Kin of my Mind. I am amazed at the degree to which all the Learned Speakers and Researchers expounding in this pool are able to pronounce accurate judgments on a species with so many physiological differences from ourselves that we don't even have names for all their limbs! They possess no equivalent of our speech spines, our bristles, or our proboscis, not to mention the fact that they have one-seventh the number of legs. We have no equivalent of their manipulative limbs or food groove, and yet we expect every orifice in their bodies to function exactly as ours do.

All these discussions have been conducted as if the Un-Kin were silent. Because our ears and our standard recording equipment cannot detect most of the vibrations they produce, this does not mean such sound does not exist. The Un-Kin produce vibrations. They produce them from their food grooves at measurable levels with varying frequencies and intensities. Un-Kin group members respond to these vibrations *at a distance pheromones could not possibly reach.*

I have just finished today's observation rotation. I was watching Un-Kin members gathering shellfish samples from tide pools. One of the Un-Kin members (whom I call Tch) required tools carried by another member (Tch Tch) who was hunting specimens a full hundred yards down the shore. Tch faced the direction of Tch Tch, enlarged its food groove and produced a short burst of vibration.

It was this vibration that Tch Tch responded to, not pheromones, which could not have possibly carried upwind on the ocean shore at a distance of one hundred yards. Further, it was not help cogitating that Tch required; it was a net and a specimen bucket. My recording is available in these archives for review. *Shh Toc Ket, Learned Speaker.*

11:00:03. From Ket Shh Shh, Learned Observer. Addressing Learned Speaker Shh Toc Ket. If standard recording equipment cannot discern what you assert are the majority of the Un-Kin members' controlled vibrations, how have you managed it? *Ket Shh Shh, Learned Observer.*

11:00:04 From Shh Toc Ket, Learned Speaker. Addressing Learned

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Observer Ket Shh Shh. Since I contracted my observation time, I have followed the procedures laid down by Kup Tak Kic and Toc Toc Kup and measured the air quality around the Un-Kin members diligently, but I also worked at quantifying and attempting to interpret their related physical movements. After all, both birds and our own relatives go through courtship and warning dances. I thought the Un-Kin might have a similar component to their interactions.

This led me to consider whether the bursts of vibration I could hear had some pattern. I presented this observation to my apprentice Shh Tic Tic, who was able to reciprocate by pointing me towards the technology of radio astronomy where radiation outside both the visible and audible frequencies is recorded and measured by precisely tuned receptors, which project the signals onto a screen as a visible wave pattern for comparison and contrast.

I am not, unfortunately, a mechanic. I've only recently been able to modify a version of such a receptor into a portable form which lets me continuously record the vibrations from the Un-Kin membership. As I've only had two contact rotations since my "vibration recorder" has been in working order, I haven't gotten enough data to create a transmitter that can accurately reproduce the vibrations at appropriate levels. *Shh Toc Ket, Learned Speaker.*

11:00:05. From Ket Shh Shh, Learned Observer. Addressing Learned Speaker Shh Toc Ket. Have you been able to discern any vibration patterns that correlate with previous observations made using standard methodology? *Ket Shh Shh, Learned Observer.*

11:00:06. From Shh Toc Ket, Learned Speaker. Addressing Learned Observer Ket Shh Shh. Unfortunately, I have not been able to contract enough observation time to record the data necessary to make such correlations with any certainty. I must also beg that you understand, I earn my contact rotations by performing academic work that does not leave me the time I need to decipher my data properly. I have herded as much responsibility as I can to my apprentice, but I am still overwhelmed.

Because only some of the Un-Kin vibrations can be picked up by standard recording equipment, the current contents of the observation pools are largely useless to my research. I gained permission from the Un-Kin members to leave one of my vibration recorders in their territory for continuous operation next to the pheromone samplers. I will enter the data into this pool as it becomes available. *Shh Toc Ket, Learned Speaker.*

11:00:07. From Learned Speaker Toc Toc Kup, Addressing Kin of my Mind. What amazes me, is how Shh Toc Ket could make so many incredible assertions and forget so many basic facts.

Scents can be transmitted over distances of three hundred yards or more. Even a Kin, if they are a trained observer, can discern the number and identitites of a room's occupants a full day after that room has stood

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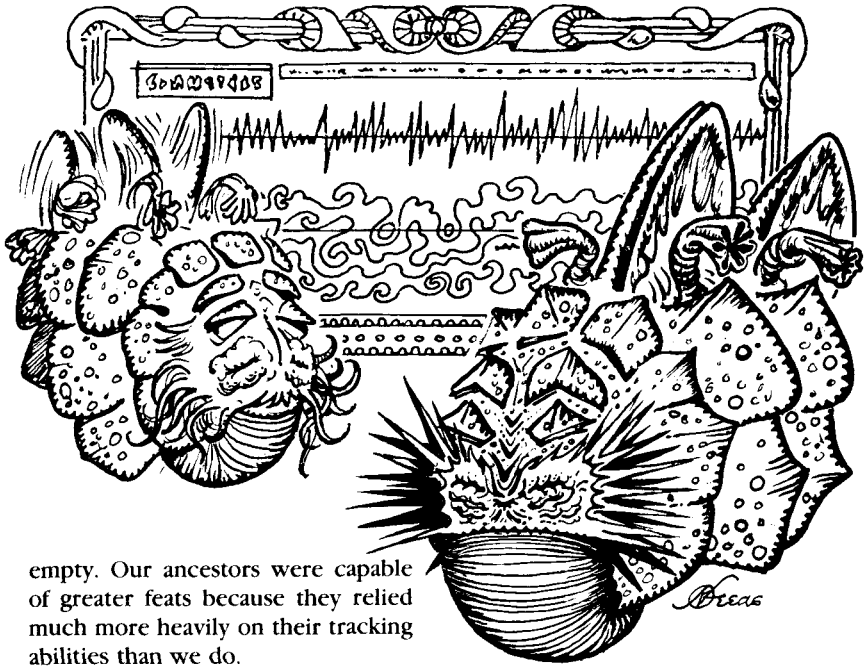

empty. Our ancestors were capable of greater feats because they relied much more heavily on their tracking abilities than we do.

If we are capable of this much, then how much more could the Un-Kin members, with their highly specialized noses, discern?

As for the behavior you observed in the two Un-Kin members, the individual units of a group intelligence would have an instinctual aversion to being separated from each other, particularly while performing a complex task. The Un-Kin members do not travel outside of their territory alone. Within their territory, they have been observed to function individually, but they congregate in pairs, triplets, or larger groups an average of twice an hour.

And let us not forget that when they talk to a Kin researcher, they always congregate at length in their sentient group before transmitting a statement or reply.

There may have in fact been a required exchange of tools between the Un-Kin members Tch and Tch Tch during the observed incident, but because Shh Toc Kup did not make any measurements of the surrounding air quality at that time, she has no idea what else was exchanged. It could have been an encyclopedic account of tide pool elements, for all we know. *Toc Toc Kup, Learned Speaker.*

11:00:08. From Kup Tak Kic, Fourth Depth Researcher. Addressing Kin of my Mind. I must agree with Learned Speaker Toc Toc Kup. Because she did not follow the estab-

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lished procedures, Learned Speaker Shh Toc Ket has seriously jeopardized her already tenuous position.

However, she has made a bold and useful step in incorporating the knowledge gained in other sciences into her work. Inspired by this, I have entered several queries into the biological research pools. I have placed full recordings of the answers to my questions in these archives. Those answers combined with the limited number of patterns Learned Speaker Toc Toc Kup has been able to discern for the Un-Kin scents have led me to doubt that the Un-Kin members' pheromonal communication has anything we would recognize as a grammar.

A group intelligence would have no need for grammar. The pheromones would act like chemical messengers diffusing across the gap juncture between neurons. The originating member would be analogous to the neural transmitter and the receiving member would be the receptor. The result of the communication would be to open or alter a neural pathway within the Un-Kin member to access stored information within the individual memory or to merge the individual cognitive capacity into the group. *Kup Toc Kic, Fourth Depth Researcher.*

11:00:09. From Shh Shh Ket, Learned Observer. Addressing Kin of my Mind. The analogy between the Un-Kin membership and cells within ourselves is an interesting one, but I have gained something quite different from Learned Speaker Shh Toc Ket's work; the fact that the Un-Kin members do produce measurable vibrations. This cannot be ignored. If these vibrations were involuntary, the Un-Kin would not have survived long enough to evolve any form of intelligence. Can you imagine a quarry that yelped "Here I am!" every time it moved?

I would at this time like to propose the following possibility. Perhaps both sides of this argument are correct. Given Learned Speaker Shh Toc Ket's vibration recordings and observations of Un-Kin membership behavior at a distance, and Learned Speaker Toc Toc Kup's discovery of scent patterns between the members, perhaps they use sound to communicate at a distance, much as we do, but use pheromones to form and function in their sentient groupings when they are close enough together. *Ket Shh Shh, Learned Observer.*

11:00:10. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. Both Fourth Depth Researcher Kup Tak Kic and Learned Observer Ket Shh Shh have made interesting and thoughtful observations. I, however, cannot agree entirely with either of them.

A herd would depend on continuous observation and appropriate group action, not concealment, for protection. So, producing vibrations that could be detected by their predators would have no effect on their chances of survival.

It is not likely, however, that the pheromones used for communication between the members of such a

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group would alter the neural pathways of the Un-Kin membership to the point of suborning individual cognition to the group mind. Informational exchange between the free-ranging members of the sentient grouping would be essential. Informational exchange between different sentient groupings is also required, and exists. We know this because a sentient grouping has been sent back to the Un-Kin world to obtain additional membership and equipment. If one member could suborn the information processing abilities of another, the Un-Kin would be one massive, collective mind. Because observation shows this is not the case, the nature of the pheromone exchange must be grammatical, not dependent on an overwhelming chemical reaction.

As for the behavior Shh Toc Ket observed between her Un-Kin members Tch and Tch Tch, I repeat that instinctual reluctance to function alone is a sufficient explanation for their actions. *Toc Toc Kup, Learned Speaker.*

11:00:11. From Shh Toc Ket, Learned Speaker, Addressing Kin of my Mind. Sufficient! Since when has sufficiency been a mark of validity! "The ocean likes its belly warmed" was sufficient explanation for our ancestors seeking to understand the sunrise!

If the Un-Kin members communicate by scent, why do the scents vary with much less subtlety and frequency than the vibrations they produce? Has anyone considered that the reason our best recorders, even the ones introduced by Learned Speaker Toc Toc Kup, do not detect any of these hypothetical "pheromonal subtleties" is that they do not exist? On the other hand, I have recorded an enormous range of controlled vibrations. I will provide my raw data to any member of this pool who wishes to see them.

Because it takes seven Un-Kin members to talk to one Kin, that does not mean it takes seven members to think of what to say. We communicate by clapping seven sets of speech spines together. The Un-Kin have only one pair of manipulative limbs per member. This physical restriction is what prevents any one member acting on its own to produce any but the simplest words. My contact rotation today provided evidence that even with this physical handicap, a single Un-Kin member could initiate basic communication.

I entered the Un-Kin territory unaware that the members were hanging a series of nets in the lower tree branches to capture insects for study. Before my speech spines could become entangled in the nets, the Un-Kin member Tch pounded its manipulative limbs together to say "Stop!" At the same time, my recording showed, it emitted a burst of vibration. At that exact moment, all the Un-Kin members on the project ceased their activities. I was recording both scent and sound at this point. There was no appreciable change in air quality between any of the Un-Kin members, but, not only was a command given to the Un-Kin,

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a single Un-Kin member recognized a need to communicate with me, formulated the correct type of communication and acted on that formulation. *Shh Toc Ket, Learned Speaker.*

11:00:12. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. I have reviewed Shh Toc Ket's recordings. When she entered the area containing the active Un-Kin there was already an elevated level of pheromones in the air, indicating that the Un-Kin group was in the middle of active communication and the intelligence system was in full operation. With the current unsatisfactory level of our pheromone recording systems, the fleeting exchange between the intelligence system and the member Tch most likely went undetected. When the new recorder/transmitter is completed we will not lose such vital subtleties.

These so-called "bursts" of vibration Shh Toc Ket has observed from the Un-Kin members are exactly that, bursts of fluctuating frequency and random duration. There is no separation of part from part. Instead, the vibrations within each burst are a continuous flow. If there is no way of distinguishing one syllable from the next, how can there be a grammar?

Further, and most importantly, Shh Toc Ket's vibration recorder shows these sounds are produced when the Un-Kin eat, when they sleep, and when a member is completely alone.

I ask you, is any further evidence needed that these vibrations are simply a physical side-effect, like your bristles extending when you get angry? *Toc Toc Kup, Learned Speaker.*

11:00:13. From Shh Toc Ket, Learned Speaker. Addressing Learned Speaker Toc Toc Kup. You really should be more careful with your metaphors. Extending one's bristles is also the way our Kin in the equatorial regions keep cool. Such mistaken cross-cultural assumptions led to several wars, a fact you can find in the child depth pools. *Shh Toc Ket, Learned Speaker.*

11:00:13. From Kup Tak Kic, Fourth Depth Researcher. Addressing Shh Toc Ket and Toc Toc Kup, Learned Speakers Both. If you have finished bristling at each other, perhaps we could continue with the purpose of this pool; useful exchange. *Kup Tak Kic, Fourth Depth Researcher.*

11:00:13. From Shh Toc Ket, Learned Speaker. Addressing Kin of my Mind. I apologize if my input strayed from the productive. What I intended to convey is that if we could make disastrously erroneous assumptions when discovering other Kin, we must be ten times as cautious about what assumptions we make regarding the Un-Kin. *Shh Toc Ket, Learned Speaker.*

11:00:14. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. I am pleased to hear Shh Toc Ket talk about caution. Given her rash espousal of unfounded theories in a research pool, I thought she had

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never been taught the word. *Toc Toc Kup, Learned Speaker.*

11:00:15. From Kup Tak Kic, Fourth Depth Researcher. Addressing Kin of my Mind. I move immediately that if Learned Speaker Toc Toc Kup makes one more personal attack on Learned Speaker Shh Toc Ket, he be denied access to this discussion pool, particularly since he cannot seem to recognize that such attacks made publicly will reflect on the rationality of the theories he backs, many of which are shared by the Kin who use this pool.

Learned Observer Ket Shh Shh's theory of the dual nature of Un-Kin communication seems to have some observational evidence to credit it. However, if sound was used as a method of communication between the primitive Un-Kin membership, it must have become secondary to the instantaneous communication that could be afforded among the group via pheromone exchange. Controlled vibration may have been a last resort, a type of warning or alarm from one member to the sentient group that they had become too separated from intelligence system to function, or that they were at the end of their assigned task and required instructions.

I must disagree with Learned Speaker Toc Toc Kup. The absence of a grammar does not mean that pheromone exchange must suborn a member's individual judgment or information retention capacity. In fact, given that sentience only occurs within groups, it probably stimulates it. It would certainly eliminate the possibility of an individual member deceiving the intelligence system, which would be extremely advantageous to the group. *Kup Tak Kic, Fourth Depth Researcher.*

11:00:16. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. My lab work on the pheromone transmitter for the Un-Kin is proceeding rapidly. The results of its introduction into the Un-Kin environment will settle the question as to whether the Un-Kin pheromones form a grammar or not.

Since no one else has taken advantage of the opportunity, I would like to show that Shh Toc Ket has finally brought the weaknesses in her own "theory" to open ground with her own words. "Only some of the Un-Kin cells produce vibrations that are . . . picked up by standard recording equipment" (11:00:06).

If the "controlled vibrations" are Un-Kin speech between individual intelligences, then why don't all the members produce the same level of sound? However, each of the individual members produce nearly equal levels of pheromones.

I observe that Shh Toc Ket's contracted observation time is almost finished. Since her access to this pool has the same time limit, we can look forward to a return to reason. *Toc Toc Kup, Learned Speaker.*

11:00:17 From Ket Shh Shh, Learned Observer. Addressing Kin of my Mind. I must admit that Learned Speaker Shh Toc Ket's theories are nothing if not infectious. I have just

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returned from my observation rotation. As the Un-Kin and I struggled through the communication rituals, I found myself wondering at the pause they made between my speech and their response. I deliberately kept myself to the phrases I knew they understood. The pause was still there. If they were acting as one mind, communicating constantly with each other, as both the pheromone theory and my own "dual" theory assert, why would they need to confer among themselves before formulating a response?

I address Shh Toc Ket directly. Will you place your vibration data in the open pool for review? *Ket Shh Shh, Learned Observer.*

11:00:18 From Kup Tak Kic, Fourth Depth Researcher. Addressing Learned Observer Ket Shh Shh. I cannot urge caution in this matter strongly enough. Your researches and input to this pool, and all other areas relating to the Un-Kin, have been invaluable. By being seen to advocate an unstable theory you are placing your viability as an information resource in jeopardy and consequently, your recent influence in the directing and apportioning of Un-Kin research and contact. I would hate to see an error in judgment herd this influence into the territory of someone less capable.

If the Un-Kin did not evolve the need to control their vibrations, they may not have evolved the mechanism to hear them. The majority of the observational evidence suggests that this is the correct view. Learned Speaker Shh Toc Ket admits she had to go to extraordinary lengths to detect the majority of these vibrations. Assuming the Un-Kin have control over the vibrations coming from their food grooves may be equivalent to assuming the beating of our hearts is a part of speech.

I have addressed Learned Speaker Toc Toc Kup directly and asked him to provide us with information about the workings of his pheromone transmitter. *Kup Tak Kic, Fourth Depth Researcher.*

11:00:19. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. I am delighted to note that this recent silence on the part of Shh Toc Ket has resulted in a swing back towards sanity.

The pheromone transmitter will actually be both a recorder and a transmitter. The recording portion has already been used to analyze the air quality around the Un-Kin. The results show the pheromones to be composed of readily available chemicals. A digital release mechanism programmed with the observed patterns and combinations will be able to match the "ebb and flow" that constitutes the Un-Kin grammar (assuming I am correct and that a grammar does exist). This is the portion of the transmitter that I am currently working on.

The resulting mechanism will be somewhat bulky because it will include canisters of the required chemicals. However, consumption rates will be reduced as our facility with the Un-Kin language increases.

With the transmitter, the Un-Kin will be able to communicate with us

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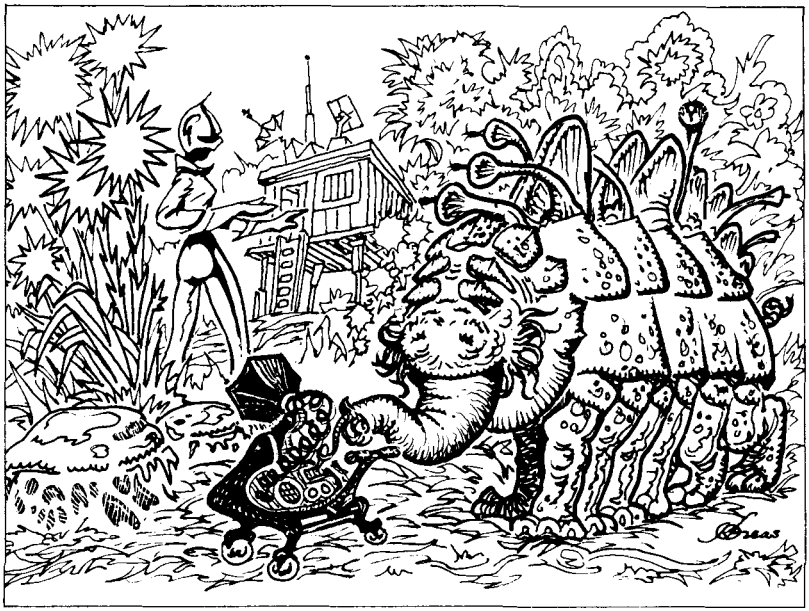

in our language and we will be able to answer them in theirs. This will place us on the open ground we all desire to reach prior to the return of the Un-Kin messengers.

I estimate another three weeks before the transmitter is ready for presentation to the Un-Kin. *Toc Toc Kup, Learned Speaker.*

11:00:20. From Ket Shh Shh, Learned Observer. Addressing Kin of my Mind. I commend Learned Speaker Toc Toc Kup on his diligence and clarity of purpose, if not on his manners. If his transmitter works as predicted, his allotment of influence will be greatly expanded and he will doubtlessly be given the contact time and other resources he deserves. I am looking forward to the results of this experiment.

Has anyone in the pool had contact with Learned Speaker Shh Toc Ket? I have attempted direct contact with her and had no response. I have not heard her input in any of the other pools either. *Ket Shh Shh, Learned Observer.*

11:01:20. From Kup Tak Kic, Fourth Depth Researcher. Addressing Learned Observer Ket Shh Shh. Unfortunately, I believe Learned Speaker Shh Toc Ket is sulking. She has withdrawn all comment from her allotted pools, has not kept up her academic commitments, and also has not used her contact time with the Un-Kin. I also see she has removed her vibration recorder from the Un-Kin territory.

Today, the communicating group of Un-Kin asked about her. I am ex-

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tremely excited. This is the first direct indication we have had that they are able to understand that we operate as individuals. *Kup Tak Kic, Fourth Depth Researcher.*

11:02:21. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. If Shh Toc Ket is not using her contracted time or reciprocating her academic grants, she forfeits both, according to her contracts. I would like to nominate Third Depth Researcher Shh Tck Kic Kic to receive her contact time.

I ran a highly successful laboratory test of the modulator for the pheromone transmitter today. I have included the results for your review. *Toc Toc Kup, Learned Speaker.*

11:03:21. From Kup Tak Kic, Fourth Depth Researcher. Addressing Learned Speaker Toc Toc Kup. Your modulator seems to be proceeding extremely well. With your next entry, will you be able to provide details on how you will handle the reproduction of conflicting pheromone emissions from two or more Un-Kin members?

I suggest that we put off reassigning Learned Speaker's Shh Toc Ket's contact time until the results of the Un-Kin reception of the pheromone transmitter are analyzed. At that time, an appropriate assignment can be made. *Kup Tak Kic, Fourth Depth Researcher.*

11:04:21. From Ket Shh Shh, Learned Observer. Addressing Kin of my Mind. I would like to remind all concerned about the portion of our contract which states we may miss up to nine contact periods without losing our time. Learned Speaker Shh Toc Ket has missed only seven. *Ket Shh Shh, Learned Observer.*

11:05:21. From Toc Toc Kup, Learned Speaker. Addressing Kin of my Mind. Learned Observer Ket Shh Shh makes a valid point. However, we also agreed to modify the contracts to allow for time imperatives. With only four months left before the Un-Kin messengers return, we definitely have a time imperative. *Toc Toc Kup, Learned Speaker.*

11:06:21. From Shh Toc Ket, Learned Speaker. Addressing Kin of my Mind. I apologize for my recent lack of attention to this pool, and to my academic duties.

I agree with Learned Speaker Toc Toc Kup. We have a time imperative. Therefore, I did not wait for laboratory confirmation before field testing the working translation and transmission version of my vibration box in the Un-Kin environment.

I would like to present for your review the recorded translation of the Un-Kin individual response to my introduction of controlled vibration reproduction into their immediate environment.

I am ready to retract my theory of individual intelligence.

UN-KIN (translated): Walker! Get out here! The anteater's talking! *Shh Toc Ket, Learned Speaker.* ■

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THE TETRAHEDRON

Charles L. Harness

The invention was uniquely suited to checking out its own patentability— but that was just the beginning!

Illustration by Christopher Bing

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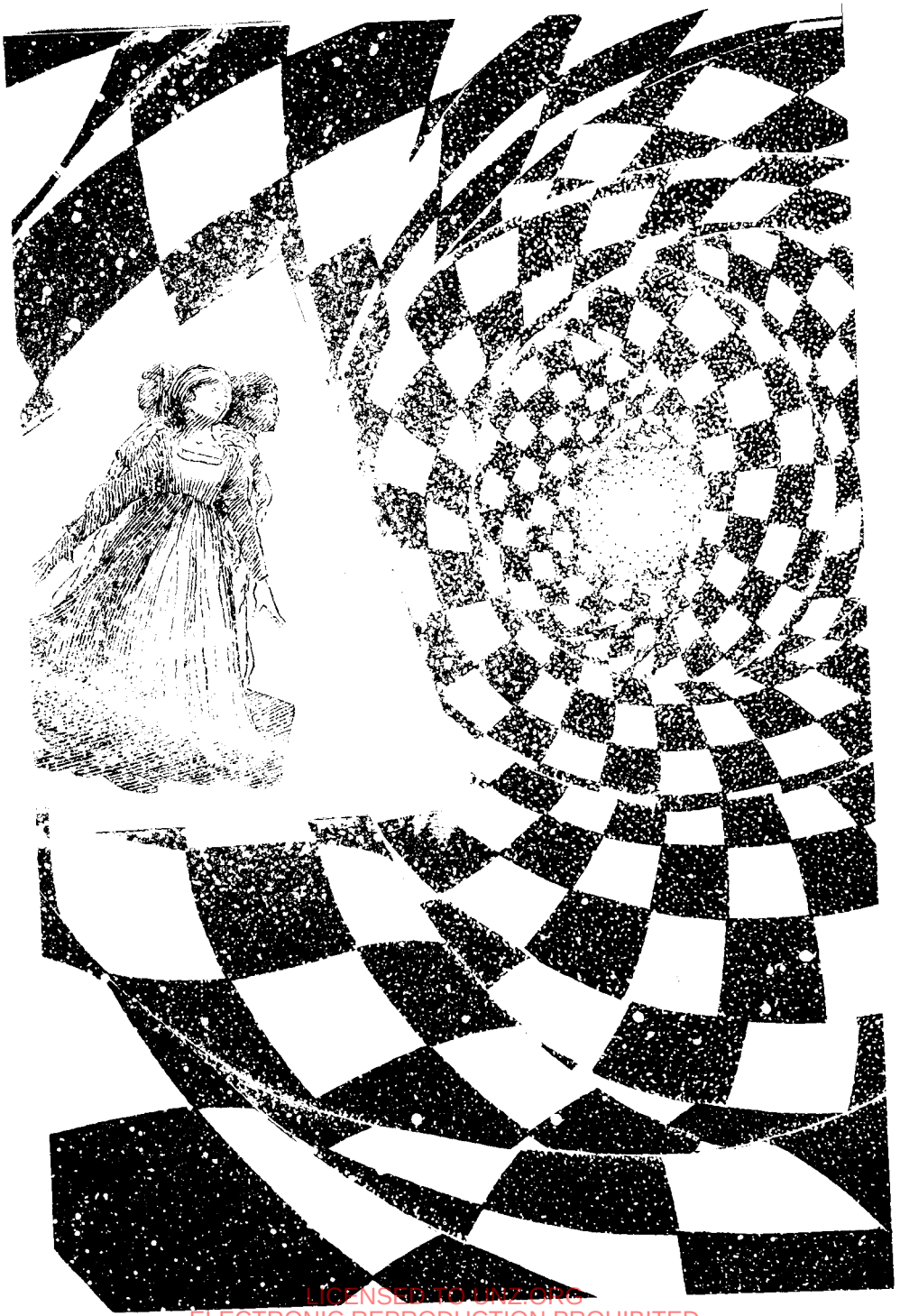

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1. Elizabeth

Elizabeth sat tightly in her chair—a chair ordinarily occupied only by very important people.

The man on the other side of the desk, the senior-most partner of the most prestigious law firm in Washington, D.C., had called her in from her little cubbyhole. Why? What horror had she, a mere junior associate, committed that required the personal attention of Barrington Wright? She was going to be fired. She just knew it.

Cocooned in tight invisible armor, Wright peered over at her somberly. "Ms. Gerard, do you know what TM is?"

TM? She thought. What the hell was *that?* Was she *supposed* to know? She suspected no. So just tell him the truth. "No, sir. I don't think I've ever heard of it."

She watched his face covertly. Yes, the muscles around his mouth seemed to relax. She had passed some sort of test. She hadn't known what TM was, and for some reason that was good.

He said in a soft monotone, "There are only ten persons in the world with TM clearance. That number includes myself—and now, you."

She blinked. They were not about to fire her. Quite the contrary.

" 'TM,' " said Wright, watching her, "means time machine."

She knew she heard him clearly, but it made no sense. She waited.

"A client," he said, "has invented a time machine. Theoretically, it works. Our Mr. Pellar prepared and filed a patent application on it." He paused and looked at his watch. "I had expected him to sit in with us, but he has been delayed coming in from the airport. So we'll go ahead with the preliminaries. To continue, the patent office has placed our patent application in interference with another application, earlier filed, and directed to the same invention." He paused and looked over at her.

She nodded. C. Cuthbert Pellar was evidently one of the charter members of this TM club. Pellar the Couth. Wright's clone, they called him—but not to his face.

Wright was saying something to her. "Do you follow?"

"Yes, sir. We're junior party. To win the interference, we have to prove that our client is the first inventor."

"And what would that involve?"

"We'd need at least a prior conception, properly confirmed, with a good showing of diligence leading to actual reduction to practice."

"And what if the client can't do any of that?"

"Then somebody should tell him he can't win. At least save him the cost of useless litigation."

"That's good advice, ordinarily. But here it's a bit more complicated. Our client is the Department of Defense."

"And Defense won't let you give up?"

"Exactly. So what do we do now, Ms. Gerard?"

"Find some really close prior art, then move to dissolve the interference, as unpatentable to either party. That way, nobody gets a patent, but DOD will be free to use the in-

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vention."

She knew very well they didn't have any "really close prior art," and that somehow she would be involved in remedying the omission. It was beginning to come together.

The intercom buzzed. "Yes?" said Wright, without turning.

"Mr. Pellar, sir," said a disembodied female voice.

"Send him in."

C. Cuthbert Pellar smiled ingratiatingly at the man who could make him partner, frowned remotely at Elizabeth, and took the indicated chair.

"Nothing?" said Wright.

"Nothing, sir. We've searched the entire field of U. S. and foreign patents, and all the scientific literature. We've spent three months and three million dollars looking for a reference to prove the TM is old in the art. We found nothing." He looked over at Elizabeth. His expression said plainly, "And she can't help."

"As I explained earlier," said the older man, "the DOD has examined the *curricula vitae* of every employee of the firm, including the associates, not only for security reasons, but also looking for special skills." He held up a printout, adjusted his spectacles, and studied the sheet. "Colonel Inman has called my attention to certain interesting facets in Ms. Gerard's background. She got her master's degree in assembling and translating ancient manuscripts. She has stack privileges in major international libraries. She is reasonably fluent in several foreign languages."

"Sir," said Pellar, "I don't understand."

Yeah, thought Elizabeth. Me either.

"Simple," said Wright. "We've exhausted the printed art; now we go farther back—into the manuscripts."

"But—" began Pellar.

"The client has requested it, Mr. Pellar," said Wright firmly. "Please describe the machine to Ms. Gerard, so that she can go to work."

"Oh, yes, sir. Of course, sir. We can start with the interference count. I quote." He half-closed his eyes and began to rattle away in a rhythmic sing-song. " 'Apparatus for shifting the space-time axis consisting of (a) silver tubes containing heavy water and positioned to form a tetrahedral framework; (b) a source of EMF adapted to cause an electrical current to flow through said framework; (c) a cubical crystal of uraninite; and (d) a mammal in cerebral electrical contact with said EMF source and said uraninite.' "

Son-of-a-gun, thought Elizabeth. He's memorized it. And meanwhile, she was thinking . . . *a tetrahedron?* Had she seen something . . . somewhere?

Pellar leered at her. "Well? Did you get it?"

He's mad at me already, she thought. The first team spent three million and crapped out. So now the problem is handed over to one lone female junior associate. And the worst is yet to come, Cuthbert, because I do indeed remember something. "Just a minute, please." She let an image form in her mind. Four equilateral trangles made of silver tubes. . . . Where had she seen this? Something in manuscript. She re-

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membered the strange writing. She ran down a mental list of the major medieval mathematicians. Geber . . . Kashi . . . Copernicus. No, none of them. How about the minors? Biagio da Ravenna . . . Paolo dal Pozzo Toscanelli . . . two of the finest mathematicians of Renaissance Italy, and both had taught the boy Leonardo da Vinci.

Of course.

That's where she had seen the sketch. In a copy of a page from one of Leonardo's many notebooks. Which one? There were dozens, and they were scattered in libraries all over the world. Yes, she had it now. The *quaderno* so recently bought by the Library of Congress. "Gentlemen," she said, "your time machine may indeed have been described in the unprinted literature."

The two men stared at her in puzzled silence.

Pellar was the first to move. He looked over at Wright. It was an expressive look, and it said, "You see, Mr. Wright, this is what you get when you bring in a woman."

Elizabeth blushed, and fought the urge to clench her fists. *This is the twenty-first century. Why do we still have to put up with this?*

"Ms. Gerard," said Wright gently, "would you excuse us for a moment?"

"Of course." She rose from her chair. They had decided she was useless, and they were going to take her off the case before she was ever really on it.

Like hell they were.

2. The Fax

She turned when she reached the door. "Before I go, I'd like to mention that Leonardo da Vinci described an apparatus very similar to that of the interference count in Notebook 23, Codex IV, pages forty and forty-one. It's in the data banks at the Library of Congress, and you can call up a fax in seconds, if you're interested." She started out into the reception room.

"Ms. Gerard," Wright called quickly. "Just a minute, please."

"Oh?"

Wright nodded toward his credenza. "Use my fax."

She walked back in, punched in the call, and the printer lasered the reply in less than three minutes. The two men hovered over the machine. No room for Elizabeth. No matter. She had caught a glimpse: a sketch of a tetrahedron, plus lines of tiny elegant letters.

"Interesting," admitted Wright. "Very. What does the writing say?" He handed it over to Pellar.

The associate shook his head. "It's all gobbledegook. Illegible. Worthless!"

"He wrote right to left," explained Elizabeth. "You read it with a mirror. I assume there's one in Mr. Wright's washroom?"

"Sir?"

"Go ahead."

"It's—" began Elizabeth.

Pellar pushed her aside, but after a moment he wailed from the little room: "I *still* can't read it."

"It's in Italian," said Elizabeth. She walked up behind him. "It says, 'A tetrahedron is required, of a size such that a man can stand within. The four triangles are formed of silver tubes

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filled with water distilled from forty tuns by the alchemist. The traveler stands in the center of the base triangle. He attaches the headband. He holds the black cube, and he atunes his mind to the . . . (hmm—strange word here . . . ah . . .) *back-time*. He sees a—hmm . . . *scacchiera* . . . yes, chessboard. By means of this assembly I was able to finish the *Cenacolo* for the friars in Milan!' "

"Chay-nak-olo?" said Pellar. "What's *that?*"

"*The Last Supper*," explained Elizabeth. "He painted it on a monastery wall in Milan in the late 1400s."

"He used the apparatus to complete a painting?" asked Wright. "How? Why?"

"I don't know," said Elizabeth. "He doesn't say."

"But, sir," Pellar said, "five hundred years ago how could anybody know anything about space-time and quantum physics? And especially this fellow Leonardo? He was just a painter."

"Leonardo had an ultra-genius I.Q.," Elizabeth answered stoutly. "Some psychologists place it at 250, some even at 300, beyond Einstein. He had brain-power adequate to create your TM. From the description that he left, it appears that he did just that."

"*Appears?*" sneered Pellar.

"I think we can nail it down, one way or the other," declared Elizabeth.

Wright swiveled his chair to face her. "How?"

"Go back. Ask him."

"Him?" said Pellar blankly. "Who?"

"Leonardo," explained Wright dryly. "Take his deposition."

Pellar was now totally bewildered. "I thought he was dead!"

"She means," Wright explained patiently, "use the TM. Go back to Leonardo's time. Find him. Take his deposition. Ask him to explain his sketch. Is that it, Ms. Gerard?"

"Yes, sir."

"Fascinating," mused Wright. "It might give us the exact art we need to dissolve the interference. When did Leonardo make this sketch, Ms. Gerard? Any way to tell?"

"The date can be fixed only roughly. It was almost certainly after he finished *The Last Supper*, in Milan, in 1498, but probably before he started the *Mona Lisa* in Florence, which we think was 1503."

"So, where would we find Leonardo in 1503?"

"From March to June, 1503, he was in Florence. He had a studio in the house of an affluent friend."

Wright regarded her with interest. "What would the locals think about the machine? And its crew, for that matter. Could you get in and out again safely?"

"There's some risk, but it could be minimized. Our Italian associates could provide a list of alberghi—inns—complete with piazzas, that have been in existence in Florence since 1500. We would come in on the piazza, just before dawn. It would be dark for a few more minutes. We dismantle the TM, pack it away, and present ourselves, properly dressed, to the innkeeper."

"So we check in," demanded Pellar. "Then what?"

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"We locate Leonardo, find a local lawyer to swear him in, and proceed with the deposition."

Wright studied the ceiling. "It just might work." His eyes dropped back to her. "Ms. Gerard, just how did you become interested in medieval manuscripts?"

"Well, sir, to sort of sum it up and cut some corners, at American U. two of my professors were international authorities in the Renaissance and its incunabula. It seemed the natural thing to do."

Wright nodded. "Yes. Undoubtedly a wise decision. Still, quite a coincidence that it should offer such possibilities in a patent interference." He leaned forward, and now his tone and manner were all business. "I'd like you to prepare a memorandum stating the essentials we'll need to consider for this deposition. I'll go over it with Mr. Pellar and Colonel Inman, our contact at Defense. Further, would you please prepare the necessary deposition notices."

"Yes, sir." As she closed the door behind her, she heard:

"Mr. Pellar, if you could stay a moment. . . ." The syllables were harsh, clipped.

As she walked away she visualized the probable tableau now going on behind her. Wright wouldn't even raise his voice, but Pellar would perspire and wonder if he could still make partner. Finally, Wright would suggest to Pellar that he prepare a suitable memo to Colonel Inman of the DOD, explaining why he, Pellar, had wasted three million dollars before getting around to the Leonardo proposal. It made absolutely no difference that Pellar was essentially blameless; it was simply the way things worked.

Anyhow, she was too exhilarated by her new assignment to feel very sorry for Pellar. All that effort in the Renaissance was finally paying off. She knew medieval Florence backwards and forwards. She knew how to dress, what to wear. She could walk across the Piazza del Signoria in 1500 and be taken for an average housewife on her way to the *panetteria*. And the way things were going, it seemed quite likely that something like that was going to happen.

She floated all the way back to her minuscule office. "Office" by courtesy, that is. It lay between the copier room and the men's washroom. Actually it had originally been the anteroom to the men's washroom, but it had been remodeled for her, because there was nowhere else to put her. The male associates had to walk behind her desk to get to the washroom door.

There were two pictures on her desk. One was a good miniature of the *Mona Lisa*, the other a photo of the house where she had been born and raised, back in Naples, Texas. She required the first because in her estimation the Lady Lisa was the most beautiful woman in history. She kept the second as a substitute for the real thing. She dreamed of going home again, but she knew she probably never would. She couldn't face her mother's highly vocal accusation: "Twenty-eight and still not married!"

Meanwhile, stop dreaming and get

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out the form book! Fix up a notice for Mr. Wright to sign and send to... who was opposing lead counsel? Larvey? Yes, Ralph Larvey, of Getterfield, White. Right down the street. Welcome to 1503, counselor!

3. Like A Smothered Mate

At the appointed time Elizabeth and Pellar drove out to the army complex near Manassas, Virginia, to meet Colonel Inman and receive instruction in operating the TM.

The colonel was a tall, thin, gray-haired man. Elizabeth knew very little about him, just that he was married, with children grown and gone away. He had several graduate degrees, including physics and law, and now he ran Special Assets.

She also knew that the colonel's consuming interest just at present was to resist buying the opposing Rosso patent application, which had been offered to the Army for one hundred million dollars.

The officer led them down a gravel path to a quonset hut. He unlocked the door, flipped a light switch, and they walked in. A seven-foot plywood tetrahedron stood in the center of the chamber.

"I thought the TM was just a framework of tubing," Elizabeth said.

"The real thing is," explained Inman. "What you see here is just a trainer, to familiarize you with the controls. We want to minimize use of the real thing. You've heard of the 'space-break' theory?"

Elizabeth nodded. One of the top DOD physicists had a theory the TM could break the time-space barrier only a limited number of times. After that, the TM wouldn't work.

"Where *is* the real thing?" asked Pellar.

Elizabeth had already figured that out. Over against the far wall stood a nondescript leather valise. By her calculations, if the tubes of the framework were unscrewed into quarters and stored with battery pack and computer console, it all ought to fit into that valise.

"It's in a safe place," answered Inman noncommittally. He held open the door of the simulator and turned on a small fluorescent. They joined him inside. "There's room for three travelers and these two cases," he said. "One case can hold the dismantled tetrahedron, including the console and battery pack. The other is intended for materials you'll need for your deposition. Take a look." He asked Elizabeth, "Is one case big enough for your needs?"

"Hm. The IBM translator and printer will fit nicely, but there may be a space problem with our power pack. Do you think we could use the TM pack?"

"What power will you need?" asked Inman.

"One hundred watts, for probably two to three hours."

"The TM pack can easily provide that. Now then, let's go on. I'm sure you both know the theory of the invention. It's based on the University of Arizona process of cold fusion. In that process, heavy water fuses to helium-four and makes heat. Simple, eh? Actually, not so simple. More heavy water was disappearing than could be

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accounted for in recovered helium-four. Asa Green, our inventor, discovered the loss was going into positive He-4—antimatter—which was not detectable because it was being consumed by driving the synthesis apparatus into the past. In the interests of efficiency and control, Green developed the tetrahedral frame of silver pipes. The heavy water circulates in each fractional pipe section. For control of gross movement he uses a crystal of black uranium oxide, linked to the console and framework by an electrical conductor. For fine tuning he uses a headband,"—he indicated a circlet of thin gold braid—"also linked to the console. This way the 'driver' maintains continuing contact with the synthesis process within the silver tubes."

"Just exactly what does this 'continuing contact' feel like?" asked Elizabeth.

"It's a visual thing," said Inman, "experienced by images created in the occipital lobe. Sort of like getting conked on the head and seeing stars, except there's no pain, and instead of stars you see shifting geometric patterns. Do you play chess?"

She had taken first prize in the D.C. Open last year. She said cautiously, "I know the moves."

"So do I!" Pellar chimed in.

"Very good. Look at it this way: time moves in quanta—seen mentally as frames of a chessboard. Each moment differs from the next by changes in position of the 'chess pieces' on the frames. As you stand in the TM and approach your destination, it may seem that the pieces are clumping around a central point, rather like pawns and pieces sheltering a king at chess. It's up to you to select the final point in time. Quite like cross hairs in the center of a bull's-eye, or a knight making a smothered mate. If you're a fair chess player you'll have no trouble running the TM. So let's start."

"Me first," said Pellar.

Inman smiled faintly as he handed the lawyer the small black cube of uraninite, and then a gold circlet. Both were attached to the console by insulated wires. "Ready?"

"Ready."

There was a sharp metallic click as Inman closed the triangular door.

Pellar jerked. "Hey!" He dropped the black crystal. "You didn't say it was going to be like *this!*"

Inman grinned. "Try again, Mr. Pellar. This time, close your eyes and imagine you're a class master, playing blindfold."

Pellar tried to a few more times, achieved a debatable competence, then passed the headband and crystal over to Elizabeth.

She caught the hang of it in seconds. She asked Inman, "When we return, do we use the same technique?"

"No. Coming back is much simpler. You don't need the headband or the crystal. You just slam the tetrahedral 'door,' and you zoom right back. You'll come to a jarring halt at your exact starting time and place." He looked at them both and smiled. "I think we're ready for Florence."

4. Florence

Elizabeth, Pellar, and the colonel were drinking cappucinis under the

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awning of an outdoor cafe on the Piazza del Signoria.

Pellar kept glancing at his wristwatch. "Larvey's late."

Inman shrugged. "Do you know him?"

"Only by reputation."

"Same here. Apparently he's a deposition wizard. I've studied all his past depositions that I can find. He's clever, sneaky, dangerous, slippery, treacherous."

"Yeah," said Pellar sincerely. "A credit to the bar."

Inman looked across the table at Elizabeth. His mouth twitched.

She smiled faintly back at him. She knew that Inman had insisted she take the TM training along with Pellar and that she be a member of the time travel group. Pellar had resisted bitterly, and finally they had compromised. Pellar could drive the machine. She would be the language link with Leonardo and the other Florentines.

"This may be our boy now, coming across the square," said Pellar. "Yes, it's Larvey." He stood up and waved.

Elizabeth observed the approaching lawyer carefully. He was about forty, hair thinning but no gray. A wide smile. Too wide, she decided.

Pellar made the introductions. He explained and excused Elizabeth's presence: "She speaks medieval Italian. Sort of a tour guide."

Let it stand, she thought.

They got down to business. Next stop, the costumer's.

"Attire must be simple, yet elegant," Elizabeth explained. "For you chaps, tunics and tights, with citizen's caps and soft leather boots. Tunics may be silk brocade, stitched with gold thread, with fur trim on cuffs and collars. Matching cloaks recommended. I shall wear gray silk, covering a plurality of petticoats, with a single strand of pearls. All these things are available locally."

"For the costume ball at the embassy?" the shop manager asked politely.

"Something like that," said Elizabeth. She watched the two men preen in the fitting room. Pellar had a good figure. His legs modeled beautifully in the close-fitting tights—tights rather like a woman's panty hose, except of heavier material. The tunic design was truly exquisite: red roses woven into a light blue background, and embroidered with gold and silver threads and paste diamonds and pearls. The outfit was completed with Gucci shoes of soft black leather, and for the tunic, a big gold buckle. As they watched, the tailor draped a knee-length cloak over the lawyer and turned him into the mirror.

Impressive, thought Elizabeth.

Larvey was similarly dressed. He caught the spirit, and pirouetted like a ballet dancer.

The once-piazza of the *Cigno Nero*, now a fifty-car parking lot, was duly cleared and closed for the night, and in the cover of darkness the TM crew set up the big canvas tent and brought in the two cases. Under Elizabeth's critical eye Pellar opened the case containing the knocked-down

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TM and began reassembly. Colonel Inman looked on silently. Twenty minutes and a few bungles and curses later, it was ready. And now a last minute flashlight inspection of her two companions. Clothing, hats, cloaks, all OK. Next, the travel case. She unbuckled the leather straps, raised the lid, and pushed aside shaving kits and extra underwear. The IBM translator/camcorder was in place. Everything ready? she asked herself. Not necessarily. She stood up and faced the men. "I think we should make sure the IBM is still in working order."

"I already tested it," Pellar said stiffly.

"Here?"

"No, back in D.C.."

"It's had several plane rides and taxi rides since then."

"If it bothers you," mumbled Pellar, "go ahead. Test it again."

Silently, she removed the unit from the case, then opened the TM storage locker, got out the power pack, plugged it into the side of the IBM, and flipped the switch. A green LED flashed in front of the translator box. "IBM," she said, "are you operational? *Per italiano?*"

A well-modulated baritone rose from the box. "Yes. I'm ready. *Posso chiederle chi è?*" "

"I don't believe we've met. *Io sono la signorina* Elizabeth Gerard."

"*Ah, Signorina Gerard, sono molto lieto di fare la sua conoscenza.*"

"*Grazie.* Do you feel competent to take a patent deposition in Italian?"

"*Sì.*"

"Knock it off, Elizabeth," growled Pellar. "The machine is working. Let's go!"

"Yes," she said. "See you later, Mr. IBM."

"*Arrivederci, signorina.*"

She pulled the plug and repacked everything. "Gentlemen," she told the two lawyers, "you may get inside." She moved in with them, handed the flashlight out to Inman, picked up the unlit lantern from the TM console, and looked around for the tinder box with its flint and steel. She found it, flicked away for a moment and got plenty of sparks, none of which ignited the exposed wick. She paused, frustrated.

"Hey, no problem," said Larvey. He pulled out a cigarette lighter, flicked it once, and touched the flame to the wick. She took the lighter from him and stuck it into her waist-purse. "By golly, Ralph," she said thoughtfully, "if you do that in 1500 Florence, they will probably lay a commemorative plaque for you."

"A plaque?" He smiled uncertainly.

"A plaque. It would read, 'Here we burned the English sorcerer, Raphael of Larvey.' "

"Oh. Sorry."

She closed the triangular door with a satisfying click. "OK, Cuthbert, take it away."

The lawyer pulled the circlet over his forehead, then plugged it into the console. He began adjusting dials.

In the semi-dark she stole covert glances at Pellar and Larvey. Were they as scared as she? Quite likely, she thought. She took a long deep breath. Out beyond the silver tubes she thought she could make out the

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vague form of the colonel. He kept fading in and out.

At that instant Inman, the tent, everything outside the tetrahedron —shimmered and vanished.

5. Where is 1503?

She watched Pellar as he studied the dials with apparent competence. The days were whizzing by like strobe lights. The retinal lag soon merged everything into a gray twilight.

She leaned forward and watched the three chronometer dials: year . . . day . . . hour. 1575 . . . 1570 . . . 1565 . . . 1560. So far so good, she thought. But—is he *slowing?* No, Cuthbert, don't slow *here*. He's almost stopping! Water's seeping in! She spoke loudly in his ear. "Cuthbert, keep moving! *Move!*"

There was a jar. "Cuthbert," she wailed, "you've hit the Great Flood of 1558. *Keep moving!* If you stop here, we'll drown!" She scurried to the rear of the tetrahedron and plucked the battery pack out of the water.

It took a moment for the message to sink in; then the senior associate accelerated so fast that it made Elizabeth's head snap.

"Too fast, Cuthbert," she cried. "You'll overshoot!"

"Shut up!" he shouted. "*I'm* driving!" But finally he eased to a stop.

They looked out through the silver rods. It was early morning. The piazza was empty. Save for one . . . man? . . . lying face down a few yards away.

"Ssh . . . " She held her finger to her lips in a call for silence. She listened. No sounds anywhere. She sniffed the air. It was sour, sickening.

She looked out toward the body again and her throat tightened. She forced a squeaky question. "Cuthbert, are you sure we're in the right time frame?"

He muttered, "Yeah, I *guess* so."

"What year? Check your chronometer."

"Check it yourself if you're so interested."

Idiot, she thought. She replaced the power pack in its frame and was about to start forward to the chronometer panel when she noted motion out in the piazza.

It was a rat, and it was headed for them.

Meanwhile Pellar, perhaps influenced by a tremolo in her voice, had returned to the instruments. "Thirteen forty-eight," he called back. "Are you happy now?"

Her calm astonished her. "Cuthbert, get us out of here."

The lawyer responded blithely. "Maybe we should get out and look around."

"Dammit, Cuthbert, will you listen? Thirteen forty-eight is the year of the Black Death. Half the city died. That's one of the dead ones over there. The plague is spread by fleas on rats. Like the one coming now. *There!*" She pointed.

"Cuthbert," urged Larvey, "let's get the hell out!"

Pellar stared open-mouthed at the oncoming rodent.

"Cuthbert?" said Larvey weakly.

Elizabeth glided quietly over to Pellar, eased the control band from his skull, and pulled it down over her

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head. He didn't protest. She doubted that he realized she had taken over. She adjusted the indicators quickly. The chessboard patterns began to come in. Slowly at first. A day. Another day. Then faster and faster. Flash flash flicker flicker. A week, a month. Faster. A year.

She visualized the cross-hairs lining up in her occipital lobe. The right year. 1503. She checked the chronometer panel. The right month. April. And then the right day and the right hour—minutes before daybreak.

They were there. She unplugged the cable but left the gold circlet on her head.

Pellar flashed a look of utter hatred at her.

6. Il Cigno Nero

She held the lantern high and looked through the silver framework out into the darkened piazza.

No movement anywhere. No sounds. That would change very soon. Dawn would be here in a very few minutes. The watch would open the city gates. The streets would begin to fill with people and carts. She looked at the men. "All clear, boys. Let's move!" She held the light while the two men unscrewed the tubing and loaded it into the TM case. "OK, now let's rouse *il locandiere*." She rattled the handle of the great iron-studded portal.

"Hey, it's locked!" complained Pellar. "Now what?"

"We knock." She picked up the bronze hammer, dangling from its chain, found the approximate center of the knocker plate, and gave it a hefty bang. The door rattled and sang with the stroke, and the piazza reverberated. She banged again. And again.

In the middle of the last assault the peep door beside the plate opened and two bleary eyes peered out. A hidden mouth rasped: "Non *c' è stanza . . . non c'è stanza . . . va . . . va . . . va!*" No room . . . go away!

She reached into her pocket bourse and picked out a freshly minted gold florin. With her other hand she held up the lantern. The coin flashed.

"We shall require the entire first floor," she declared in firm Italian. In the local custom, she knew, that meant the second floor.

"All taken . . ." gurgled the innkeeper. But his eyes never left the coin.

"*Quanti clienti?*" she asked. How many guests?

"*Otto.*" Eight.

"How much for each, the night?"

"Forty soldi."

"You mistake yourself, innkeeper. I know it to be ten soldi, rules of the Innkeepers Guild. No matter. Return their money. Double it. Nay, triple it. Roust them out. For your trouble take the florin."

She heard the creak of sliding bars and chains being unlatched. The door opened a crack. "*Signorina*, come around here, *per favore*."

She took a step to the right and held the coin up by thumb and forefinger.

A fat bare arm flashed out. The coin vanished. The door clanged shut. After a moment the door grated fully

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open. The innkeeper, still in the process of trying to fasten his tunic belt, looked out into the courtyard. *"Dov'è la vostra carrozza?"* Where is your carriage?

"On its way back to Pisa. Now, will we come in, or not?"

"*Oh sì sì.* Come in, *signorina, signori.* Wife, get their bags."

Elizabeth asked, "How do you call yourself?"

"Antonio—Tony—*signorina,* at your service. And this is my wife, Anna." They both bowed laboriously.

"And who, *signorina,*" asked the innkeeper, "honors my humble *albergo?"*

"A commission from his majesty, Henry, King of England," she said calmly. "I shall explain certain things to you at the proper time."

"Of course, *signorina,* of course." Host and hostess ran greedy eyes over the newcomers, noting the rich clothing and especially the string of pearls around the woman's throat.

Wife pulled husband aside and held a hurried discussion with him. He turned back to Elizabeth with a face radiant with woe. "I had forgotten various extra expenses."

"How much?" she said dryly.

"Two additional florins. Three altogether."

She handed over the coins. "Now, Tony, let this be the end of it. It would grieve me to have to report you to the *Signoria.*"

He listened uneasily. "No, *signorina,* no need for that. Here—" He handed back one coin. "You see, because of my love for your King Henry, I am willing to lose money."

Like hell, she thought.

She looked around. They had entered the main room, a combined kitchen with fireplace, dining room, and recreation room. There were several tables with benches. Cuts of meat and fowl, together with garlands of garlics, leeks, and onions hung from hooks on the walls. Overhead, chickens roosted in the eaves. She took a deep breath. These were the sights and smells of barnyard and kitchen on Grandfather Gherardini's farm back in Texas. She was home.

She noted that her two companions were absorbing all this in growing horror. She suppressed a grin.

On the far side of the room a black-bearded man sat at a table, staring at them. Correction. Staring at *her.* Oh well, have to expect it. Strangers in town. Very strange strangers. But he was a bit odd, himself. For there was no plate or knife in front of him. Instead, a chess board.

She turned back to Tony. "We would like the rooms as soon as possible."

"Of course! Of course!" He wiped his hands on his apron and smiled effusively. "My wife will prepare your chambers. There may be a slight delay. She will have to, ah, *negotiate* with each of our patrons. While we wait, would the *signorina* and her noble companions care for wine?"

"We decline for the moment. We will talk later of wine and other matters."

"The gentlemen do not speak our language?" asked the innkeeper.

"No, they speak only English. I interpret and translate. I am called Eli-

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sabetta, and I am daughter of the English ambassador in Napoli. This gentleman is Lord Cut'berto, of Georgetown; the other gentleman is Lord Raphael, of Arlington."

"Ah . . . I see." He looked them over shrewdly, then back to her. "You are here to see—*him*."

"*Him?*" She knew exactly what he meant.

"Leonardo, *signorina*. Great men, rich men, they come to him. *Maestro*, they beg, paint me, paint my wife, my daughter, my favorite greyhound. But no. He paints only as he pleases. Meaning no disrespect, milady, but I think if you even try to find him, he will vanish."

"But *you* could find him?"

He shrugged. "Perhaps."

They were interrupted by an outburst of howls, shrieks, and imprecations from the rooms overhead.

7. A View of the River

The innkeeper smiled apologetically but did not look up. "My good wife is negotiating the refunds. Your rooms will be ready very soon."

"What's all that racket?" demanded Pellar. "What's going on?"

Elizabeth pointed. A loud, disconsolate procession was stumbling down the broad oaken stairs: six men, two women, their nakedness covered in varied degrees. Their complaints died away when they beheld the three regal visitors.

"Former occupants," explained Elizabeth quietly. "Checking out."

Eyes downcast, the ex-guests filed respectfully past the newcomers. Two or three turned off toward the kitchen; the rest shuffled out the front door and disappeared.

Elizabeth faced Tony. "You have done well. Here's your florin back. For this I want you to send up various things to eat and drink. We would like warm red wine, and various meats and fruits, together with butter, cheese, and fresh-baked bread. You can manage that?"

"Of course, noble lady."

Half an hour later, when they were properly installed upstairs, they reassembled in Elizabeth's room. She handed the waiting innkeeper a little package. "Five ducats for you, Tony, if you place this in the hands of Leonardo within the hour."

"Count it done, noble *signorina*." He turned to go.

"Wait—there is a second matter."

"Oh?"

"Involving litigation. We require a notary, a member in good standing of the Guild of Judges and Notaries."

"A notary . . . Hm. There are several good ones, milady. What will be expected of him?"

"It is a matter of legal deposition. I will be putting questions to a witness, and Lord Raphael will cross-examine. Everything must be done in accordance with certain rules."

"I see," said Antonio. "Let me think a moment. Yes, the best for this sort of thing is probably *Signor* Rucellai."

"Rucellai? How long has he been a notary?"

"Over twenty years, milady."

"He comes in here to dine occasionally?"

"Often, milady."

"He appreciates a good table?"

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"He does, he does."

Very good. A profile was beginning to emerge. She sensed a complaisant functionary who would render the necessary services without asking unnecessary questions and who could be relied upon to spend most of his time at the side table. "His Christian name?"

"Biagio, if you please."

"He's our man, Tony. Please send for his excellency, *Messer* Biagio Rucellai. You may tell him that our great King Henry appreciates prompt service."

After he left, she noted that the two men were nibbling at things on the side table.

The morning was warming up. She walked over to the little window and looked out. *Il Cigno Nero* was on a slight rise, and she had a nearly panoramic view of the city. There was the great cathedral, with Brunelleschi's famous dome. Beyond that, Giotto's campanile tower. And then the Arno and its beautiful bridges. Downriver somewhere was the estate of Francesco Giocondo, whose wife Lisa would soon enter immortality at the hands of the great Leonardo. Leonardo had sworn to paint no more women, but he had seen La Gioconda, and he had changed his mind.

Pellar walked up behind her. "You really ought to keep us better informed, Elizabeth. What was in the package? Where's it going?"

"Oh, sorry, Cuthbert. Our landlord claims Leonardo sees no one. I figured we needed something special to attract his attention. So I took Ralph's lighter and wrapped it in a photocopy of page forty-one of the TM fascicle, and held it all together with a rubber band. A gift to Leonardo."

"I don't get it," said Larvey.

"It's easy, Ralph. Your lighter tells him we're from his future, and page forty-one tells him how we got here. Even the rubber band says something. He'll add it up, and he'll come. Also, Ralph, I should mention I've sent for a local officer of the court. Meanwhile, we'd better get the IBM set up. Cuthbert, would you please put it under this little table. You can drape a cloth over the table to hide it, but make sure the lens has a good view. Ralph, would you close the door."

Larvey had hardly shut the door when there was a knock on the other side. He opened it a crack. It was the innkeeper.

Elizabeth came over to the door and held a brief discussion with Antonio.

8. A Member of the Guild

"What'd he say?" demanded Larvey.

"The notary's downstairs. Are we ready?" She examined the center table critically. The cloth seemed to hide the IBM translator adequately. She turned back to Antonio. "Will you please bring him up?"

A moment later the innkeeper returned with a short, fat, well-dressed gentlemen. "*Signorina, signore*," said Tony with great composure, "my privilege to introduce a leading notary of our fair city, the most learned, brilliant, and wise *Messer* Biagio Rucellai."

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"We thank you for your kind assistance, Antonio," said Elizabeth. She added with calm hauteur: "You may leave us now."

The innkeeper bowed once more and closed the door behind him.

Elizabeth turned to the newcomer and inspected the distinguished *Messer* Rucellai in silence. It had evidently been a considerable labor for him to mount the stairs, and he was still puffing. He wore the characteristic four-cornered hat of a working Renaissance lawyer, a deliberately ambiguous forked beard, and finally, and most importantly, the notary's robe, grave and somber with its broad black stripes on dark red background. A leather pouch hung from a strap over one shoulder.

She smiled graciously. "We are honored, *Messer* Rucellai. I am Lady Elisabetta of Napoli, daughter of the English ambassador there. I am interpreter for these two gentlemen, who speak only English. This gentleman is Lord Cut'berto of Georgetown, and the other gentleman is Lord Raphael of Arlington."

The notary bowed deeply. "Milady . . . milords."

Elizabeth continued. "We are here on a commission to see a certain citizen of Florence."

"Oh, of course. You wish to commission a painting? A statue?"

Elizabeth interrupted. "No, nothing like that."

"No? Ah, I see. You wish to *sue* a Florentine. Yes?"

"Dammit Elizabeth," complained Larvey. "What's going on? I'm entitled to know."

She turned back to him. "Of course you are, Ralph. Just turn on the IBM. The remote is there on the table. You can sit over there by the window and get a good readout on the CRT. You too, Cuthbert."

And back to the notary. "Excuse the interruption, *Messer* Rucellai. The gentlemen are fatigued and wish to rest."

"Of course," he said dubiously.

"But you and I will continue. Sue, you ask? No, not that, either. We merely require a deposition—a sworn statement from one of your citizens. The statement must be made in the presence of a member of the Guild of Judges and Notaries, which is to say, yourself. The final document will require your seal."

"I am never without my seal." He patted the leather pouch.

"Excellent, *messer*. These are bothersome little details, but I'm sure that an official of your standing is familiar with all of them."

He bowed. "Naturally." He looked about the room. "But where is your deponent?"

"A messenger has been sent for him. We expect him at any moment." She paused. "And now, *Messer* Rucellai, we come to the matter of your fee."

"Fee? *Fee?* Oh, milady, you cut me to the quick. Members of the Guild serve all, rich or poor, without charge or fee." He drew closer and whirled his cloak so that the side pocket gaped at her. "Yet, noble *signorina*, we acknowledge that sometimes, completely unsolicited and totally unbeknowst to us, a grateful client

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may press a modest retainer upon us . . . such as may be within his means . . . or hers. A ducat for the day, as it were." He watched her, at first with mild anticipation, and then with growing fascination as with slow hypnotic gestures she loosed the drawstring of her waist-bourse. He sensed the thud of a heavy coin in his cloak pocket. He stifled a gasp. That was no mere ducat! That was—*gold!* A florin! Was it possible?

He gathered all his courage and continued hoarsely: "Two, if the matter be complex."

Clink!

Madre di Dio!

He closed his eyes. "And for the guarantee of satisfaction in all details, major and minor, for assurance of complete harmony in all matters, expected or unexpected—"

Clink!

Messer Rucellai began to perspire; he decided to quit while he was ahead. He sighed and closed up his fee pocket. "If milady will excuse the question, we come now to the crux of the matter. Who is your deponent?"

"Leonardo da Vinci."

He thought about that. "I must warn you, milady, Leonardo is a very independent man. If he refuses to come, I will refund—"

"No need for that, *Messer* Rucellai," said Elizabeth. "In any case, I am certain that he will come."

There was a heavy knock at the door.

"*Entri!*" called Elizabeth.

The door opened. A tall bearded man in a rose-colored cloak stood in the doorway. Gray hair fell loosely to his shoulders. He took off his cap and looked about the room with cool blue eyes. His shoulders were broad; his hands surprisingly large. Elizabeth was ready to believe the stories that he could straighten horseshoes with his bare hands. Yet his features were fine, patrician, almost feminine.

His eyes came back to her.

9. Leonardo

For a full moment, with shameless candor, the trained anatomist examined her. He seemed to take mental measurements of throat, breasts, waist. Then back to the face, estimating proportions of cheek, brow, nose, lips.

He spoke in a low resonant voice. "You are very beautiful. I will paint you." He held up Larvey's lighter. "In time, how far away?"

Messer Rucellai watched all this with open mouth.

Elizabeth found a small squeaky voice. "*Messer* Leonardo, I am not beautiful, and I cannot imagine why you would want to paint me. Aside from that, and before I answer your second question, please indulge me a moment. I am called Elisabetta. And here is Raphael, and there Cut'berto." They all traded bows. "And you may know our honorable notary, *Messer* Biagio Rucellai?"

Artist and lawyer exchanged nods.

She continued. "*Messer* Rucellai has not yet had breakfast. Our host has provided certain nutriments, all on the side table, with fine Tuscan breakfast wine. We will excuse you, *Messer* Rucellai, while you attend to

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your breakfast."

The notary got the message. Actually, he had had bread and sausage within the hour, but he didn't like to oppose this golden client. He hurried to the table and fell to.

Elizabeth returned her attention to the artist. "*Messer* Leonardo, we are from the year 2003. We live in the New World, discovered by Cristoforo Colon in 1492. In our day the New World has grown very populous, and inventors have made great discoveries in the sciences. In my country we have a system of laws that grants an inventor a seventeen-year monopoly on his invention. Our government issues a document—a patent—to the inventor certifying to his monopoly. Sometimes two inventors seek patents on the same invention. The government must then consider all facts, and issue the patent only to the first inventor."

"But suppose neither is the first inventor?"

"In that case nobody gets a patent." He catches on fast, she thought.

"And that's why you are here?" He held up the photocopy of page forty-one. "You think *I* invented the machine?"

"Did you?"

"Yes."

She took a deep breath. "Maestro, will you testify to that? We have a device here that will record everything you say, translate it into English, and will finally make a printout."

" 'Printout'?"

"Like the pages in the books of your *Signor* Manutius."

"I see." He was thoughtful. "Your civilization seems quite advanced. All right. I will do it."

"Thank you. First, the notary will have to swear you." She called over to the banquet bench. "*Messer* Rucellai?"

The lawyer turned and acknowledged her signal with a sonorous belch.

Pellar shuddered.

"*Messer* Rucellai," she said, "will you please administer the oath to *Messer* Leonardo?"

The notary wiped his mouth on his sleeve, then, aided with a mouthful of mutton, he mumbled a polysyllabic litany.

"Thank you, *Messer* Rucellai," said Elizabeth. "In a little while we will need you again, to swear our recorder."

Leonardo looked puzzled. "You will swear a *machine* to tell the truth?"

"Something like that. The device is not only a recorder, it also serves as an interpreter. It translates my questions and your answers into English, so that Cut'berto and Raphael may follow the course of the deposition. Under our Code an interpreter has to be sworn just as any other witness."

The artist shook his head in wonder.

She called over to the notary. "*Per favore*, *Messer* Rucellai."

"Monna?"

"Please swear our interpreter."

The notary looked about the room, then back to Elizabeth.

"He's under the table," explained Elizabeth. "You can't see him for the cloth."

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"Oh. That's the way it's done in England? How does he call himself?"

"*Signor* Ibi Emme."

The notary called out: "*Signor* Ibi Emme!"

From under the table: "*Presente!*"

"*Signor* Ibi Emme, do you solemnly swear to translate accurately and completely, in full idiom, from one tongue to another, as required, adding nothing and omitting nothing, so help you God?"

"I do."

"*Grazie.*"

"*Prego,*" said *Signor* IBM.

Messer Rucellai exchanged nods with Elizabeth then returned to his table.

10. The Deposition

"I will speak in English for the benefit of attending counsel," Elizabeth told Leonardo, "and the IBM machine will immediately translate into vocal and printed Italian. *Messer* Larvey will follow the same procedure. Your responses will be in Italian, and they will be similarly translated into English. Is that satisfactory?"

The artist nodded. "Of course."

She began. "Please state your full name and your residence."

"Leonardo da Vinci. I live in the house of Andrea Martelli, in the Street of Brickmakers, Florence."

"What is your occupation?"

"Painter, sculptor, civil and military engineer, architect, inventor."

"*Messer* Leonardo, I hand you a sheet of paper purporting to show a geometric figure. Can you identify this?"

"Yes. It's a copy of a page from one of my notebooks."

"Showing—what?"

"A sketch of a tetrahedral machine for going back in time."

"Did you actually make such a machine?"

"Yes."

"When?"

"At Easter, in the year 1498."

"Please describe that machine."

"As you see from the sketch, it was shaped as a tetrahedron, forming a framework of silver tubes. These tubes were four ells on a side."

"Empty tubes?"

"No. They were filled with special water."

"Water from where?"

"From Dr. Marcos, a local alchemist. He had started with one hundred thousand jars of well water, and over a period of ten years, he boiled it and boiled it, until only five jars were left."

"Objection," intoned Larvey. "Hearsay."

Elizabeth said: "Let the record show that the specification of the party Rosso described such residues as a source of heavy water. Let us continue. *Messer* Leonardo, what, if anything, was associated with the framework?"

"A collection of alternating plates of copper and zinc. The plates were half an ell square and were separated by thick felt paper soaked in vinegar. The collection was about two ells high. I attached a silver wire to the topmost plate, which was copper, and another silver wire to the bottommost plate, which was zinc."

"What, if anything, did you do with

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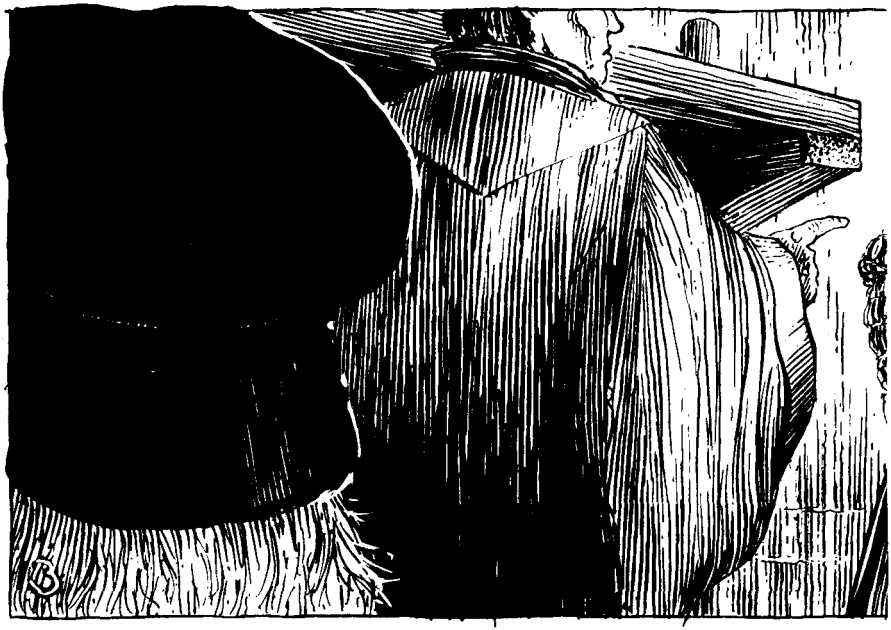

this collection of metal plates?"

"I attached one of the silver wires to the upper apex of the tetrahedron and the other to another apex."

"Go on."

"I clasped the black cube in one hand."

"Describe the cube, please."

"Half a finger on a side. Heavy for its size. Strange texture, somewhat reminiscent of pitch. It was mined at Jachymov, in Bohemia, and was presented to Duke Ludovico as a mineral rarity."

"Let the record show that the witness has described uraninite, or pitchblende. Now then, *Messer* Leonardo, how did you come to invent your time machine? What was your purpose?"

The artist thought for a long time. "It goes back to the cenacolo."

"Meaning *The Last Supper*?"

"*The Cenacolo*, yes. The Duke Ludovico asked me to paint a cenacolo for the Dominicans at their monastery in Milan, and I began the preliminaries in 1495."

"When did you finish?"

"In ninety-eight."

"There were delays?"

"Actually, except for two faces, the work was completed within the first year."

"Which two faces?"

"Our Lord . . . and Judas. I could not visualize the divinity of the one, nor the evil of the other. So I delayed."

"But eventually you visualized the two?"

"I *saw* them. All of them: Jesus and the twelve."

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She frowned. What was he saying?

He continued. "That's why I made the time-tetrahedron. So I could go back."

"To when? And where?"

"To the Upper Room of the Last Supper. Nearly 1,500 years ago. I saw them all. Then I returned to Milan, and I finished the faces."

"So you found . . ." But the words faded in midsentence. Hold on here! she thought. Other than the final trip to France, where he died, there was no record that he had ever left Italy. And yet . . . and yet . . . she knew he was telling the truth. In that year of the Crucifixion, he had been in Jerusalem. *How?* she thought. How had he done this impossible thing? There was only one way. He had set up his machine in Milan, and from there he moved practically instantaneously in both time *and space!*

The man understood things about the TM beyond their wildest imaginings.

Her companions were watching her in silence. Pellar's expression showed that he was merely curious as to why she had stopped. Larvey's mouth was curled in a sardonic grin. *He* knows, she thought. He saw it almost as soon as I did. You're good, Ralph.

She began quietly. "Is it your testimony, Maestro, that you saw Jesus and the twelve disciples at the, shall we say, *original* Last Supper, in Jerusalem, in the year 33 A.D.?"

"Yes. Except the year was 29 A.D. The early Christian fathers miscalculated the year of His birth."

"You were actually *there?*"

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"Yes."

And now Pellar was waking up. He shot a warning glance at her. It said, he's lying! Back off!

Interesting. Larvey's face held the exact opposite message: Right on, Gerard! Go on! You're already in over your head. Screw it up!

Maybe Cuthbert's right, she thought. Maybe I should quit while I'm ahead. But then she caught Larvey's wordless sneer. Wordless? No, it was full of words: You're a weak, timid, incompetent *female*.

OK, Ralphie, that did it!

Back to the artist. "*Messer* Leonardo, how far is Jerusalem from Milan?"

He gave her a congratulatory smile. "As the crow flies, about 650 leagues."

Larvey folded his arms over his chest and watched with narrowing eyes.

She said with calm fatalism, "How did you get your machine to Jerusalem?"

"Willpower, Monna."

Willpower? With that answer, had her witness thrown away his hard-earned claim to credibility?

Can't quit now, she thought. "Willpower, *messer?*"

"It is no great thing, milady. With a little practice, any left-handed person of fair intelligence can do it."

"Clarify, please."

"Yes. My studies of the human brain indicate that each of the two hemispheres has its own set of special functions. The right hemisphere controls the left side of the body. It also controls our sense of pattern, geometries, visual arrangements, spatial positions. I'm sure all this is well known to your physicians and savants who work with the mind. Is it not so?"

"Much recent work has been done," agreed Elizabeth. "Go on."

"Well, first, I set up the machine."

"Where?"

"In my studio in the Sforza palace, in Milan."

"What next?"

"I connected the wires, held the black crystal tightly, and then I concentrated on moving in both time and space. I had already decided that the journey toward Jerusalem of 29 A.D. should be made with movement of two years and three months per league. Do you want the itinerary?"

"If you please."

"Well, past Florence, down the ridge of the Appenines, past Ravenna, over the Adriatic, through the Straits of Otranto. Then over Macedonia and the land of the Ottomans. Next, the Sea of Crete. The year is now about 765, and I'm halfway there. Athens—now a part of the Byzantine Empire—is next. Then into the eastern Mediterranean, or Mare Internum, as the Romans called it. By the time I passed Rhodes, I was in the era of the Caesars. Suddenly it's the first century and I'm over Jerusalem. I find the Garden of Gethsemane. I leave the tetrahedron there. It was the time of Passover, and everything is a busy mess. The cooks and servants ignore me. I take an apron. I walk up those stairs." He paused, as though thinking back on what he had seen next, then he took a deep breath. "The whole thing was over within the hour."

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Elizabeth said: "So you found what you needed? Jesus? And Judas?"

"Yes, I found them, but I did not understand what I had found. Judas? I looked at that face, and I looked for evil. I do not know. It was the face of horror, of despair."

"And Jesus?" Elizabeth asked carefully.

The artist looked up at the ceiling. "It is not easy to speak of this. After Judas left the table, I saw the face of Jesus that I needed for the Cenacolo: a sublime sadness. It was that face that I tried to paint. I failed. That face defied painting."

"*Messer* Leonardo, when you returned from Jerusalem to Milan, what did you do with the machine?"

"I destroyed it. My intrusion was a terrible thing. Never again."

"Thank you, Maestro. That completes my direct. Cross, Mr. Larvey?"

"Yes, thank you, Ms. Gerard." He faced the artist.

11. Larvey on Cross

"Just a couple of short questions, *Messer* Leonardo." He folded his arms as he waited for the translation. "Is it your testimony that you journeyed some 1,500 years through time and some 650 leagues over land and sea, all within a fragile metal framework?"

The artist pondered that. "Rather incredible, isn't it? And yet, surely it is more probable than your claim to have journeyed from a time that does not exist."

"I . . . well then, this Last Supper. Did they see you?"

"They paid no attention to me. I wore an apron. I carried in a plate of bread."

"And a slice of lemon?"

"Lemon?"

"In copies of the painting that I have seen, there's a lemon slice on the table. Do you realize that lemons weren't introduced into the Mediterranean area until the twelfth or thirteenth century?"

"No. I didn't know that."

"And you put everyone on one side of the table. It wasn't really that way, was it? They were spaced all around the table?"

"In the Upper Room, they were spaced around on both sides of the table. But in the painting I put them all on the far side so the monks could see the faces."

"And in that alleged Upper Room, did they actually sit on a long bench?"

"No. They sat on straw mats, on the floor."

"Your painting lied?"

"No. In the painting it was easier to see them, sitting on benches."

"Did Judas actually put his bag of silver on the table?"

"No. That was symbolic."

"So there were many differences in what you saw, or thought you saw, and what you painted?"

"Yes."

Larvey sneered. "You're a real bastard, aren't you, Leonardo?"

"Objection," said Elizabeth indignantly. "Counsel is insulting the witness."

Leonardo shrugged. "Oh, I am not offended, Monna. True, I was born out of wedlock, but I honor both my parents. I am especially proud of my mother, Caterina. She was a servant

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girl in an albergo where my father stopped one night. *That* developed into an ardent love affair, but my grandfather da Vinci forbade marriage. Thus, in 1452, I was born illegitimate."

"*Messer* Leonardo," said Larvey, "you have admitted your illegitimacy, and you have admitted falsehoods in your paintings. I put it to you that you are not merely a bastard—you are a *deceptive* bastard."

"Objection," declared Elizabeth. "Counsel is again insulting the witness. If you keep this up, Mr. Larvey, we shall terminate this deposition on the grounds of grossly improper conduct by the party Rosso."

"I can *prove* deception, Ms. Gerard."

"Then do it."

"I will. *Messer* Leonardo, you have filled a number of notebooks with sketches and written comments?"

"Yes."

"But your writing is not easily read?"

"I can read it."

"But the ordinary layman needs a mirror? Because you write deceptively—from right to left?"

"I go right to left because I am left-handed. That's the easy way for me."

"Let it pass," Larvey said huffily. "You draw from life, *Messer* Leonardo?"

"Preferably."

"But you like to draw demons and dragons?"

"On occasion."

"Have you ever seen a demon or a dragon?"

"No."

"They're simply images in your head—illusions?"

"Yes."

"Like your illusions of building a time-space machine and visiting Jerusalem?"

"Objection," called Elizabeth.

"Withdraw the question, and that completes my cross."

"I have no redirect," said Elizabeth. "It appears that we are finished, *Messer* Leonardo."

The Florentine stood up. "So now you will be going back with your friends?"

"Yes, tomorrow."

"I take weeks . . . to paint a woman's face."

"I know."

He sighed. "Well, it must be. You say we are finished here? I can leave?"

"Let me check." She looked over at Larvey. "I think the printout is finished. Do you want him to read and sign?"

"No. I want him out of here."

"*Messer* Leonardo," she said, "you have the right to read and sign the record. Do you want to do that?"

"No, I'd just as soon not, but I'd like to see what it looks like."

"Of course. Please come over here. Just let me get one more entry into the record." She spoke quietly. "The parties and the witness waive reading and signature." She waited a moment, then pulled the fan-fold pack from the printer basket. "This is the record. See, two columns, Italian and English. All our questions, all your answers."

"My congratulations," he said softly.

They watched in silence as he

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closed the door quietly behind him.

12. A Motion to Suppress

Elizabeth called over to the credenza. "*Messer* Rucellai, can you join us here for a moment?"

He walked over, holding a mutton chop in one hand and a half-capon in the other.

"We now need a certificate from you," she explained, "to the effect that you duly administered the oath to *Messer* Leonardo before the commencement of testimony."

"Easily provided, Monna."

"You mean you actually have with you such a form?"

"Yes, indeed." He placed chop and drumstick on the table top, wiped his fingers on the cloth, and pulled a sheaf of papers from the folds of his cloak. "Let's see. Eviction, divorce, complaint for money owed, deed for the sale of land, ah, here we are, certificate for a deposition."

She read it carefully. "Very good, *messer*. It conforms nicely. Will you please fill in *Messer* Leonardo's name, then sign and date it, and affix your seal? Should I send down for pen and ink?"

"No need, Monna." From another cavity in his clothing he pulled a little ivory box, and from this a small quill and stoppered vial of black liquid. He filled in the blanks with a flourish, waved the paper in the air to dry the ink, then pulled his seal from its leather pouch and pressed it into the corner of the form. "Anything further, Monna?"

"No, that's all, I think."

He looked down at the half-eaten fowl and chop.

"Please," she said.

He picked them up, then studied the table and its draping cloth. "Could I say goodbye to *Messer* Ibi Emme?"

"Of course."

The notary called out to the invisible translator. "*Arrivederci, Messer Ibi Emme.*"

The reply floated up from under the table. "*Arrivederci, Messer Commendatore Notario. Sono molto lieto di fare la sua conoscenza. Tante cose alla famiglia!*"

"*Piacere! Ciao!*" The Florentine walked toward the door.

"What the hell was that all about?" asked Pellar.

"They were just saying goodbye," said Elizabeth.

The door closed behind Rucellai, and the three were alone.

"We're still on the record?" asked Larvey.

She looked down at the green light on the IBM. "Yes."

He said calmly. "I move to suppress the entire deposition."

Elizabeth and Pellar exchanged glances. The partner-aspirant shrugged. That nonchalant lift of the shoulders translated into, "Elizabeth, you got us into this. You get us out."

She said, "Mr. Larvey, will you please state the basis of your motion?"

"I certainly shall. You are familiar with 17 CFR 1.674(b)(3)?"

"I'm familiar with the sense of the section. A person who is an employee or agent of a party is disqualified as an officer for conducting the deposition.

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So?"

"An interpreter is considered an officer of the court. The IBM interpreter is your property and under your control. Hence it is your employee and agent. Hence disqualified." He smiled at her.

"Ownership does not make the machine either our employee or our agent. In any case, the IBM is not a 'person' as called for under the relevant CFR section."

"He has third level A.I.," countered Larvey. "That's enough to give him a personality, and a biased personality, at that."

She considered her opponent thoughtfully. Here, she told herself, is a bitter, vengeful man. He knows his only recourse now is to try to discredit the record. "Mr. Larvey, when did you discover this disqualification in the IBM interpreter?"

"In the beginning."

She said, "Mr. IBM, will you please quote 37 CFR 1.685(c) in pertinent part for Mr. Larvey?"

"Of course. 'An error or irregularity in the manner in which testimony is handled by the officer is waived unless a motion to suppress the deposition is filed as soon as the error or irregularity is discovered.' "

Elizabeth smiled agreeably. "Mr. Larvey, if you ever had any right to suppress, you waived it by not making your motion at the beginning of the deposition." She paused. There was a silence. "Surrebuttal, Mr. Larvey?"

He gave her a long strange look. For once she was glad for Pellar's presence in the room. She sensed that Ralph Larvey very much wanted to beat her brains out. Larvey turned his face to the window and did not reply.

She faced the IBM and spoke in a low monotone. "The Party Rosso offers no surrebuttal. These proceedings are terminated." She added, "And I think we might as well disconnect the machine. We'll need all that's left in the power pack for the return trip." She leaned down and pressed the switch. The little green LED went off.

What now?

She walked over to the credenza. The table was nearly stripped. *Messer* Rucellai had been thorough. Where had he put it all? She wasn't hungry, but in discharge of her maternal duties she would reorder for the two men. Not that they deserved anything.

13. The Bridge

She joined Pellar for supper in the adjacent sitting room. It was a chilly evening, and she added a couple of split oak logs to the fire before she sat down at the table.

Pellar was expansive. "Well, Elizabeth, I did it. I pulled it off. I won. I'll make partner."

She took a deep breath. *Get control, Elizabeth!* "Where's Ralph?"

"Sulking in his room, probably plotting something wicked." He looked around the table. "Where are the forks?"

"Forks won't be invented for another fifty years. Use your fingers."

"Damn primitives," he muttered. He tore a leg off his roast capon and started nibbling at it. "Good stuff, Elizabeth."

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"Cuthbert," she said evenly. "If we are able to prevent Rosso from getting his patent, it will be largely because of *my* efforts. *I* found the relevant notebook pages. *I* located Leonardo. *I* persuaded him to testify, and *I* conducted the deposition."

Pellar replaced the half-eaten bird on his plate, wiped his fingers on the table cloth, took a sip of wine, and studied his recalcitrant companion with judicious male eyes. "Of *course*, Elizabeth, of *course*. You were a big help to me. So relax, and eat your supper."

Like a good girl, she thought. "Cuthbert," she said, "because of my work, you'll soon be a partner, with a big corner office where you can see the river, and with a staff of juniors and secretaries. If anybody deserves to make partner, it should be me."

He stared at her, astonished. "But Elizabeth," he sputtered, "you're a *woman!*"

She got to her feet unsteadily. "I think I'll go for a walk."

Brooding, she wandered the deserted twilight vias, letting her thoughts and feet go where they would. The narrow streets, most of them barely alleys, arched overhead with timbered walkways that made a fretwork pattern against the darkening skies.

She passed the old stone *bottega* where the youthful Leonardo had been apprenticed to the great Verrochio. Art historians claimed the High Renaissance—the *terza maniera*—had been born in that shed. She sighed and went on.

You might as well accept it, she told herself. You will hang your tail between your legs, and you will trail Pellar back to your office next to the men's washroom, and there you will finally fade away.

She stopped and looked around. It was getting dark. Was she lost? No, wait, there's the approach to a bridge. Must be the Ponte Vecchio, "Old Bridge." Very old, in fact. The foundation arches had been laid by the Romans.

Downstream (she knew) bordering both sides of the Arno, began the considerable estates of Francesco del Giocondo, the husband of Mona Lisa. Oh, *Signora*, how I wanted to meet you!

She squinted down river, but it was too dark to see anything, except maybe a half dozen lanterns just off shore. Fishermen, at night? A bit strange. But she didn't really care anymore.

She returned to the arches, pulled off her slippers, and tossed them over the stone rail. Then she clambered over the railing, screamed once, and dropped.

14. Francesco

She flailed and thrashed, now under, now breaking the tumultuous surface. Her struggles were irrelevant. Even if she now changed her mind, and wanted to live, she knew it was not possible.

She awoke in fits and starts.

Her throat burned. Her gut ached.

She felt a flicker of heat on her cheeks. She tried to sit up. She groaned and sank back into the cush-

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ions of the great chair.

She was wrapped in blankets, and she was facing an oversized fireplace, afroth with flame.

Behind her, someone spoke. It was a male voice, authoritative, yet gentle. She caught the words: "See if she is waking."

The face of a child—a girl of some ten or twelve years—peered into hers, and broke into a happy smile. "Yes, father, she wakes!"

Elizabeth winced as her diaphragm muscles cramped. Under the blankets, she put her hand on her bare belly. *I'm nude.* She tried to turn around to face the man.

"No, Monna," he said quickly. "Don't move. We will adjust the chair."

Human forms materialized from nowhere and lifted and angled the chair so that she faced away from the fireplace. A man stepped forward and bowed. "Monna, I am called Francesco."

She beheld a tall man in his early forties, with dark hair and bushy black eyebrows. She imagined great strength in the arms and shoulders. Warm intelligent eyes studied her face.

He nodded toward a short skinny man with bushy white hair and a black cloak that seemed to swallow him. "This is Doctor Marcos, who brought you back to life."

The doctor bowed modestly. (Marcos? Leonardo's alchemist? Oh doc, she thought, how could you?) But she pulled herself together and inclined her head in silence. And now she understood why her abdomen hurt. Marcos had used the current system of artificial respiration: they had draped her over a horse, and they had trotted the poor animal in a circle until all the water in her lungs had been jolted out.

"My daughter Dianara," continued the master.

The child curtsied. Elizabeth nodded gravely.

"And my overseer, Lucas, and his wife Lucrezia. Becco, who helps in the stables, and Maria, the finest cook in Tuscany."

She nodded as appropriate, all the while thinking, Francesco . . . Dianara . . . ? Could it be? She whispered hoarsely, "Francesco del Giocondo?"

"The same, Monna."

"Your lady," she blurted, "Monna Lisa? She is perhaps away?"

He frowned, puzzled. "Monna, I am a widower. There is no Monna Lisa in my house."

Elizabeth blushed under her pallor. God, what a *faux pas!* He hasn't met her yet. "Oh, I'm sorry . . . "

Her confusion embarrassed him. "You are not from these parts?"

"No. I am called Elisabetta. I am from Napoli."

"Wha—? Oh, *Napoli!*" said Giocondo. "Of course! You're the interpreter with the Englishmen, at the *Cigno Nero.*"

It was an invitation to talk, but she didn't feel like talking. "I must be getting back," she said.

"Monna Elisabetta," said Giocondo doubtfully, "it is long after curfew. You must stay here tonight."

He was right. "Can a message be sent to the inn?"

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"That we can do. A mounted courier with sword and lighted pistolet will escort the good doctor to his home and then go on to the inn. What message shall we take?"

"Just say I'm safe and will return in the morning."

"It will be done. And while I make the arrangements, the doctor would like you to take a little wine. It's the red wine of Cyprus, thick, and mulled with pistachios and cloves. After that we will take you upstairs to your room." He handed her a silver cup, half-full. It was warm to the touch. She took a sip. It was delicious.

She was only vaguely aware when someone took the cup from her hand, lifted her up, tucked the blanket decently about her throat, and started upstairs with her. *Messer* Francesco, she thought dreamily, you have a wonderful male smell.

She was lowered gently into something soft. Somebody—the cook—was pulling a nightdress over her, and tucking coverlets around her chin. She heard a little girl's awed whisper, "Oh, Maria, she is so beautiful. Do you think she will stay?"

The responding voice sounded dubious. "All will be as God wills. Come, child."

She slept.

15. Monna Lisa

A noise—*noises*, rather—awakened her.

She listened to the sounds. They were coming from downstairs. These were *kitchen* noises. Pots and pans. Cutlery.

She remembered now that she had eaten nothing at all yesterday. With or without an invitation, she was going down into that kitchen.

Where had they put her clothes? She looked over at the draped alcove. She surmised that it was actually a dressing room, hopefully with commode and wash basin. She walked barefoot over to the little cubicle and pulled the drapes aside. In the dim light she could see that her clothes had been washed, dried, touched here and there with a warm iron, and hung with great care on wooden rods.

No shoes, but there was a pair of brand new slippers, evidently measured exactly to size.

She opened the commode lid. The bowl contained a scented liquid. Violets? And there, on the table, was a roll of fluffy linen paper.

She sighed. *Ah, that Francesco!* Is *he* why Monna Lisa smiled?

And it's really very curious. Where *is* Lisa? He hasn't met her yet. But all the chronologies put her in this house—*now*.

She pulled her nightgown off and dressed quickly. She brought a measure of order to her hair with the comb and brush she found on the washstand. She examined herself in the dressing-room mirror. Plain but tidy. She stepped out into the room and looked around. Her headband lay on a night stand by the bed. She picked it up and pulled it on over her forehead.

That's when it hit her. She gasped once, then grabbed her abdomen in a struggle to breathe.

She saw it all, complete: an inte-

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grated panorama. She will marry this good man. She will bed him. His hands, his mouth, will be all over her, touching, caressing, stroking, kissing.... She will glow, radiant as the full Moon. Truly, she will be beautiful. Truly, Leonardo will paint her. Truly, there will be a marvelous portrait, and it will eventually hang in the Louvre. For who is Monna Lisa? *I am.*

Not so fast, Elizabeth!

There was just one little problem: According to well-authenticated history, Monna Lisa would accompany her husband on a trip to southern Italy some forty months from now, and there she would die of a fever.

Well, so be it. At least those forty months would be spent with people who loved her. And that's not all. Tradition even gave her a seasonable pregnancy and a little son.

So, Monna Lisa-to-be—or Mona, as the English say—let's get the show on the road. Still breathing hard, she pinched both cheeks delicately, just enough to give a spot of pink. Then she opened the door and walked out into the hall.

She smelled it instantly. Coffee! In Italy so soon? She started slowly down the stairs.

There was a scurry down below. Evidently someone had been set to watch for her.

And there, very suddenly, was Francesco Giocondo at the bottom of the stairs, holding out his arms in wide and cheerful greeting. "Monna Elisabetta! *Buon giorno!* How did you sleep?"

She smiled at him. "I slept wonderfully well, *Messer* Francesco."

"Then let us sit down a moment and have something to drink, with bread and honey... or whatever would please you."

She took a seat on the bench across the table from him. Maria sidled up behind her with plate, knife, and spoon. "What to drink, madonna?" she asked softly. "Milk? Wine? Water?"

Elizabeth looked over at the dark liquid in Francesco's cup. What did they call it? Not coffee. That came from the french word *cafe*, a century later. "What drinks milord?" she asked.

"It is called mocha. The Venetians bring it in as beans from Mocha, the Arabian port. Maria roasts and grinds the beans, and makes an infusion with boiling water. It is a new thing. It helps one to wake up in the morning."

"Really? May I have a taste?"

"Of course." He passed the cup over. "Careful. It's hot, and you may find it somewhat bitter."

She took a sip. "Ah!" She passed the cup back to Francesco, then looked up at the hovering Maria. "I liked that, Maria. Now, could you pour me some, perhaps in a smaller cup, with this much milk?"

"Right away, madonna!" She was soon back.

Elizabeth found the honey jar and stirred in a spoonful.

Francesco watched all this with great interest. "A taste, milady?"

She handed it over. He sipped noisily. "Oh... good, *good!* Milk and honey much improve the taste!"

Elizabeth slapped butter and grape

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jelly on her bread and began the best breakfast she had had since Texas. And while she had him here, she might as well clear up a few points. "*Messer* Francesco, about last night. Would you mind if I asked some questions?"

"Go ahead!" He leaned forward, almost eagerly.

Well I'll be darned, she thought. *He's* the one who should be asking the questions, like, *signorina*, how did you come to be in the river? But he's not going to pry. She took a long pull at the mocha, then exhaled slowly. "*Messer* Francesco, you were on the river rather late yesterday."

"Yes, madonna, fishing after sunset *is* unusual. It is hard to see anything, even with good lanterns. But last night was special."

"Special?"

He pulled a piece of folded paper from his pocket and handed it over to her.

She read:

Fisherman! Tonight the House of Venus stands in the sign of Pisces.

"Your horoscope?"

He nodded. "Doctor Marcos."

She handed it back. Things were clearing up just a little. "Please continue. Pisces? Something about fish?"

"*Perhaps* fish. And there was still the question of Venus. She rose from the waters, you'll recall. But the only water around here is the Arno. So, Monna Elisabetta, mostly because of my very great curiosity, I was there on the river bank, watching our *pescatori*. Sure enough, they hauled you out."

She smiled. "I'm very glad you went fishing, *Messer* Francesco."

"So am I." He paused. "We must do something about names. I am simply Francesco."

"And my friends call me Lisa." *From now on, that is!*

"Lisa," he murmured. He rolled the word in his mouth, as though he were sampling a new wine. "Yes, Lisa. I like that very much. Monna Lisa."

It was official.

He said slowly, "I suppose you must return to your friends this morning. I will order a carriage soon. Meanwhile, do we have time to show you my house?"

"Plenty of time. And certainly, I would like to see Dianara again."

16. The Flowers

"This is the central bedchamber," he explained. He pointed to the gigantic four-poster in the center of the room. "Dianara was born in that bed. It is not used at present. The nursery was through that door."

He opened one of the double doors in the east wall, and they stepped out into an expansive loggia that ran half the length of the house. He pointed to a brilliant patch of sunlight on a nearby hill. She gasped; it was gorgeous.

He looked at her and smiled. "Dawn comes first through that gap in the hills, and covers the slope, there, where you see the flowers. Dianara loves to walk there. She brings home dozens of bouquets, but for every flower she cuts, ten more spring up."

They heard throat-clearing sounds in the chamber behind them. They turned to see Dianara with a basket

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full of irises. The girl curtsied deeply. "They are for you, milady."

"Ah!" Elizabeth radiated pleasure. As she held out her hands for the basket, she noted that the child's feet were wet. Obviously she had gone into the fields barefoot so as not to risk her shoes and stockings. "They are beautiful!" On sudden impulse she bent over and kissed the girl on the mouth.

Dianara grabbed her around the neck, noisily returned the kiss, then turned and ran out of the room, singing, "*Rimarrà, rimarrà!*" She will stay, she will stay!

Elizabeth looked down at the imprint of small bare feet in the deep pile of the rug, then quizzically up at Francesco. His face seemed a blend of awe and pleasure.

She did not know what to say. He wants me, she thought. His daughter wants me. I want them. Why isn't something happening?

The man led her down the hall. They stopped by a glass-fronted bookcase. She pointed to one of the books. "May I?"

He pulled it out for her. "It's a book about the game of chess, by the Spaniard, Luis de Lucena. Very instructive, if you like chess, that is."

She opened the flyleaf. On the left a copper plate engraving of a somber bearded man stared up at her truculently. That face, she thought . . . looks familiar. Where have I seen him? Ah, yes. The man at the chess table at the *Cigno Nero*! The staring man. The great Lucena, champion of Spain, France, and Italy, playing the locals for a few ducats? Singing for his supper, as it were?

She looked further. On the right, the author and title: Luis Ramírez de Lucena/*Repetición des Amores e Arte de Axedres*/Lambert Palmart, *Impresar*/Valencia/1497. Discourse on Love, and Art of Chess. It was actually two books in one binding. The first, the Discourse, would eventually attain fame as the most virulent antifeminist document of all Spanish literature. Already she detested Luis Lucena.

She replaced the volume, then stood and faced her host squarely. "Francesco, you have a great need for a woman in your home, a wife for you, a mother for your daughter, someone to manage the house and the servants. But you hold back, because it would be your third marriage, and you think you might be condemning the woman to death. You, a mortal, cannot be blamed for what is ordained. You should make the most of what remains." She almost glared at him. Dammit, she thought, *propose to me!*

He took an immense breath, then grasped her hands firmly. "Listen to me, Monna Lisa. You know I have buried two wives . . . two very good women, whom I loved dearly. And you must know I am bad luck. Yet I ask you, despite all this, will you marry me?"

She knew what her answer was going to be; yet she too had to be honest—up to a point. "Before I answer, let me explain something. On occasion, my ways may seem a bit strange to you. I am from another country, you know."

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"Understood."

"Secondly, there can be no dowry."

He shook his head. "It is not required."

Fine, she thought. Forget the dowry. But with her next statement she knew she was dealing from strength. "Leonardo wants to paint me."

He looked at her in amazement. "Lisa *cara*, you are a very beautiful woman. But I am a merchant, and Leonardo paints only noblewomen."

"I am not beautiful, Francesco. I must correct you there. Still, he wants to paint me. He asked yesterday morning, but I had to decline, because our commission was scheduled to return today. But now I shall stay, and Leonardo will paint my portrait."

"God is bountiful," he muttered. "The wife of Giocondo, painted by the great Leonardo! I must begin now, assembling the fee."

"No fee, my friend."

"How can you say that? He does not paint for nothing."

"He will paint me for nothing, but he will keep the portrait."

"Ah. I see. Well, most remarkable." He laughed a short half-believing chuckle. "Leonardo resumes painting, and he paints La Gioconda! So now, Monna Lisa, will you marry me?"

Still holding hands with him, she bowed slightly. "Milord, you do me great honor to ask me to be your wife. I accept with pleasure."

He embraced her warmly, then held her by the shoulders. "We must send word to your legation to delay departure, so that they can attend the wedding."

She thought, Cuthbert Pellar attend the wedding of a third-chair associate? Fat chance! "They cannot stay, dear Francesco. Their high liege lords require their immediate return."

"Oh? Too bad. Well, then, we must at least tell them the good news. I'll send now for the carriage."

17. Lucena

The *carrozza* pulled into the piazza of the *Cigno Nero* and stopped near the big iron doors.

"Please wait here," she told him. "I have to explain things and say goodbye."

"Of course. Take all the time you need."

Pellar was waiting for her inside. "Dammit, Elizabeth, we've been worried sick about you!"

She was immediately suspicious. "Cuthbert, what the hell is going on?"

He managed a feeble grin. "First of all, Elizabeth, I'd like you to meet *Señor* Lucena."

Lucena? She looked around. A gloomy bearded man was shouldering his way through the front circle of idlers. Yes, it was he—the great chess master and antifeminist. A few meters behind him she noted the two TM cases and the bag of florins.

She further noted that Ralph Larvey was standing off to one side, arms folded across his chest. His face was wreathed in a smile of cold triumph.

A heavy gray lump of concrete began to solidify in her stomach.

The Spaniard bowed deeply and gracefully. "*Señorita, sono lieto di conoscerla.*"

She ignored him. She whirled on

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Pellar. "He suckered you into a game of chess, didn't he?"

The lawyer said weakly. "He was just a local *potser*, Elizabeth, but he got lucky."

"*Lucky?* Godalmighty, Cuthbert! Do you know who he is?"

"What do you mean?"

"This is Luis de Lucena, currently chess champion of Europe!"

"Jesus, Elizabeth, how was I to know? But actually, there's no need to get in an uproar. We can get everything back. All we have to do is, you spend an hour with him upstairs."

She stared at his averted face for a full minute. "Start at the beginning."

"Well, as I said, he suggested we play."

She said, "First, though, Ralph and Lucena had a little discussion, probably using an interpreter. Right?"

"Well, yeah. How did you know?"

So this is Ralph's revenge, she thought. "Then Ralph came over and said here was a local *potser*, and you could beat him easy. Right?"

Pellar nodded dumbly.

"And you beat him, that first game."

"I did. And it was easy."

"Then he suggested a little wager."

"Yeah. I won again."

"Then you started doubling, and redoubling, and you began losing."

"Yeah."

"And you lost everything."

He shrugged.

What was left to say? When Larvey came over, she murmured. "My compliments, Ralph. That was very neatly done."

He smiled. "It's nice to be appreciated."

Pellar looked at both of them, puzzled. "Honestly, Elizabeth, I tried everything. I think Tony even sent for Leonardo, but—"

"Elisabetta."

She whirled. "*Leonardo!*" So he *had* come; but how could he help?

The artist took her by the elbow and moved her out of earshot of Lucena. He spoke quickly. "First, a question. How were you able to guide your machine to the day and hour?"

"I received special training in pattern shifting; it's much like chess play."

"Are you fairly good at chess?"

"I'm very good, Leonardo."

"Then you must challenge him. His stake will be your cases and money. Can you raise a stake?"

She thought a moment. "Yes. And Maestro, would you be so kind as to be my second?"

"Yes, milady." He stepped over to the Spaniard, and they entered into a heated discussion, with much waving of arms. Finally Leonardo returned. "He will play one game, for all that he has taken from Lord Cut'berto, provided your stake is acceptable."

"Thank you, *Messer* Leonardo." Now it was time to confront the chess lord of Europe. "*Señor* Lucena."

He bowed. "*Señorita.* What stake, please?"

She placed both hands behind her neck and unclasped the string of pearls. "They are valued at ten thousand florins. Examine, if you like."

Pellar gasped. "No! No! Elizabeth, they're *rented!*"

The Spaniard scowled. "What does he say?"

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"He says that he is certain I shall grind the bottom of the Spanish pig into little sausages."

"Ha! Does he now?" There was an ugly scrape of metal as the Spaniard pulled his rapier several inches out of its scabbard. Elizabeth gulped. "Listen, why don't we start?" She handed the strand of pearls to Leonardo. "There. Leonardo will hold the stake."

"Then let us draw for color," growled the chess master.

Color was important. She was thinking hard. She needed a sure-fire opening, something truly murderous. If she had the white pieces, she could lead the game into the deadly Evans Gambit, invented by Captain William Evans of the Royal Marines in 1824. But—to play the Evans she had to have the white pieces. There was only one sure way to get white: as odds-giver.

She said, "There's the question of odds."

His face hardened. "I do not give odds."

"You? No, of course not *you*. As the stronger player, *I* give odds."

"*You!*" He laughed in cold disbelief.

"Myself."

"You are *loca*. All right, what odds do you give?"

"I shall play *bendato*."

He looked puzzled. "Blindfold?"

"Yes. Without sight of board or pieces."

It gave her great pleasure to listen to the gasps. Evidently none of them had ever heard of blindfold chess. She pulled a white silk handkerchief from her bodice, tied it about her eyes, and took a chair facing away from the chess table. "Set up the pieces. As odds-giver, I take white."

"But how will you know my moves?"

"You will call them over to me, and I shall do the same for you."

She listened to the rattling of the chessman as they were set up behind her.

"Ready," called Lucena. "Your move."

"*Pedone al quarto scacco del re*," she called. Pawn to king four.

He replied instantly. "And pawn to my king's fourth square."

And the game was on.

On her fourth move she called out, "*Pedone al regina cavaliere quattro*." Pawn to queen knight's fourth. *That* was the critical move in the Evans opening: the pawn offer.

There was a dead silence. Ha, she thought, he's never seen the Evans before! The question now is, will he take the bait?

Finally Lucena called out, "Bishop takes pawn."

She had him.

The game proceeded. The Spaniard's replies began to slow. He was in trouble, but he was fighting. He clustered his pieces in a protective shield about his king.

Elizabeth paused a moment and considered. The position cried out for a smothered mate. Yes, there it was. She called out in a firm clear voice, "I announce checkmate in two moves."

Silence. What was going on? Could she have been mistaken? No! She got

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up and removed her blindfold and walked over to the table. The position was exactly right. The smother was there.

Lucena looked up grimly. "There is no mate in two, *señorita*. There is not mate at all. You forfeit."

"*Señor*, there *is* a mate in two." She captured a defending bishop with her queen. "You must recapture, yes?"

He grunted. "So I recapture, and you are a queen down, and there is still no mate."

"Your bishop no longer protects this square, *señor*. My knight moves in, and mates—so." She moved the piece. "*Scacco matto!*" Checkmate.

The bearded man stared at the board, then at her. His cheeks turned red. He scowled. "All right, it's checkmate. But one game decides nothing. We shall play two out of three."

"No!"

There was a commotion at the doorway.

It was Francesco, with Leonardo right behind him. The artist had evidently gone out for reinforcements. She groaned. She hadn't wanted to involve her fiance.

Giocondo took in the situation at a glance. He faced the chess master. The room grew still as he spoke slowly, quietly, and with great presence. "*Signor*, in matters involving my betrothed, you may address *me*." His right hand rested lightly on the pommel of his sword.

The Spaniard looked dubiously at the newcomer, then at Elizabeth, then back at the glowering merchant. He took one last longing glance toward the gold-bag, then bowed deeply to them all, and he left.

Elizabeth let out a deep breath.

Francesco bent over her. "Are you all right?"

"I am fine." He had asked no questions, and he asked none now. He had simply waded in and protected her. She said, "Soon, I will explain everything. Just now I must say farewell to my friends upstairs."

"Of course, Lisa. Oh—*Messer* Leonardo asked that I return these to you." He handed her the strand of pearls. "I will wait here."

Pellar had already recovered his aplomb. Larvey favored her with a thinly-veiled scowl. But each of the two picked up a valise and followed her silently up the stairs.

Down below, Francesco was calling for the innkeeper. "Tony! Wine for everyone! Set 'em up!"

Just like the Old West, she thought.

18. Decision

UNITED STATES ARMY

Memorandum

TO: A. G. Perry, General, Pentagon, Division of Special Assets

FROM: K. R. Inman, Colonel

RE: Project TM; Patent Interference, *Green v. Rosso*

The Patent Office has formally dissolved this interference, as unpatentable to either party. The decision is perhaps moot, since we are advised by our technical people that the TM cannot be used again for an indefinite period, owing to strains in the space-time fabric created by our last use. Certain other aspects of the Project are best reviewed off the record.

(K.R. Inman)

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* * *

19. A Smile

She sat again in the comfortable straight-back chair in Leonardo's *bottega*. It was early afternoon. The light was soft, clear, luminous, relaxing—just right for painting.

On the carpet off to the left, Dianara played with the beautiful long-haired cat. Outside in the garden a small fountain splashed. From behind the screen off to the right two unseen musicians were playing quietly, one on pipes, the other with a lyre of the artist's own invention.

Leonardo stood aside from his *cavaletto*—the three-legged easel—and considered her. "And now," he said, "we need a smile." Already he was sketching in the outlines of her face with light strokes of the charcoal pencil. As he worked, he murmured to her, almost as though talking to himself. "Dwell thou on the happiest moment of thy life. Thy nuptial day, perhaps? Or rescue from the river?"

He watched the subtle change in her face with wonder and delight.

Her happiest moment? Ah, she remembered. Pellar and Larvey had stood inside the TM, ready to leave, in their upper room back at the Black Swan, and waiting impatiently for her to join them. Pellar had motioned to her with an imperious jerk of his chin. She had put her left hand on the handle of the door and she had swung the panel back and looked at both of them.

"That's *it!*" marveled Leonardo. "Hold that expression." Oh, yes! This woman was saying something wonderful about life. And death, love, suffering, endurance, all woven together, and emergent in fantastic unity in that smile. What memory, what thought—*thoughts*—had brought this transfiguration?

She was standing just outside the TM, and Pellar had shouted, "Dammit, Gerard, *get in here!*"

And she had calmly replied, "No, Cuthbert, I will not get in there. If you have further business with me, look for me in the Louvre."

Pellar's mouth had dropped. "The Louvre? Wha—?"

(Her happiest moment? Oh yes, she remembered!)

Next, she had finished what she had come to say, and they had both looked at her, first in blank disbelief, and finally in pink-cheeked horror.

"And now may I suggest," she had said sweetly, "that the two of you, jointly and severally, go fuck yourselves." Then she had slammed the frame door. The TM had shimmered . . . and vanished.

20. Déjà Vu

C. Cuthbert Pellar and his new bride spent their honeymoon in Paris, and on this particular day in June, mostly because Mrs. Pellar insisted on it, they found themselves in the Louvre.

They proceeded with the standard treasures, the Venus de Milo, the Nike of Samothrace, the Hera of Samos.

"Yes, dear?" he said.

"Are we supposed to meet someone here? You keep looking around."

(Look for me in the Louvre, she had said.)

"No, we're not meeting anyone.

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I'm just trying to see what there is to see." God, what a mess *that* had been, when they got back, and no Elizabeth. It had taken the entire upper echelons of the Pentagon, working with Barrington Wright and the FBI and the CIA, to hush the thing up. Fortunately, Colonel Inman was on their side. It was almost as though he had expected Elizabeth to stay behind. He had provided the basic story, with supporting documents: Elizabeth Gerard was on the passenger list of Italia 816, the ill-fated Concorde blown up over Lisbon by a terrorist bomb. Wright had appointed Pellar to notify Elizabeth's next of kin. After which the associate had made partner.

Mrs. Pellar said, "They've got some famous paintings in here," she said. "What's that thing by Leonardo da Vinci?" "

"There were several."

"The most famous one of all. *You* know . . . "

"The *Mona Lisa*?"

"That's it. Let's find the *Mona Lisa*. We'll have to ask someone."

Together they walked up to the *Renseignments* desk, occupied by a bored youth reading a paperback.

"*S'il vous plaît, monsieur*," said Pellar politely, "*où se trouve La Mona Lisa*?"

The boy didn't look up. He pointed off to his left with a thumb. "Down that hall, turn right at the second corridor. No flash."

A moment later they stood before the masterpiece. "The greatest painting in the world," he said softly. "I met him, you know, Leonardo."

"I thought he was dead."

Pellar was silent. He didn't want to go into that. Besides, he was studying the portrait. That face . . . had he met her during the time of the deposition? La Gioconda? The wife of a rich Florentine named Giocondo? He was pretty sure he hadn't met any such woman. And yet, it nagged at him. He *had* seen this face—this transcendant beauty—before. Where? When?

Think back. Back. The women there. . . .

There had been a servant girl, practically a child. And the wife of Tony the innkeeper. And the cook, an old woman. The only other female on the scene had been . . . *she?* Look hard. *On her forehead.* Is that the TM head-band?

Oh great God! Don't let it be *she!* Oh no no no *no*. He closed his eyes and moaned.

Mrs. Pellar looked up in alarm. "Cutie–?"

He turned his back to the portrait. "Let's get out of here."

"But . . . oh, all right." She looked back. Wasn't there something about a smile? Was the lady smiling? Hard to say. ■

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THE FORCE OF THE TIDE

I have just returned from WesterCon, the annual West Coast SF convention which is always held over the July 4th weekend. In several discussions I had there with writers and fans, the subject of *tidal forces* came up. I realized that this physics idea often arises in SF discussions in connection with black holes or space construction or "world building" for story backgrounds. It is also a subject about which there seems to be considerable confusion. So I decided do this Alternate View column on gravitational tidal forces. I will use a question-and-answer format for the discussion.

Q: *What makes the tides?*

A: The Earth, Moon, and Sun circle each other in a free-fall dance, their orbits a delicate balance of mutual gravitational attraction and centrifugal force. One might think that in such free fall all the forces would be completely "used up," but this is not so. The left-over gravitational forces from the Sun and Moon produce tides that move the waters of Earth's oceans by dozens of feet and create changing stresses and displacements in the Earth's crust. These left-overs are called "tidal forces."

Q: *What are tidal forces?*

A: An object is in a stable free-fall orbit when the gravitational force acting on it is in precise balance with the centrifugal force of its orbital motion. The center of mass of the Earth is in such a free-fall orbit, but at all locations away from the center the gravitational pull is slightly out of balance with the centrifugal force of the orbital motion, and there is a small residual force. This is the tidal force. It is called "tidal" because at the surface of the Earth this residual force moves the water in the oceans and causes the ocean tides.

Q: *In what direction do tidal forces act?*

A: To answer this question, consider a space station orbiting the Earth. The center of the space station is in a correct orbit, and no tidal forces will act there. Above the cen-

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ter (in the direction away from the Earth) the gravitational pull has fallen off a bit due to the inverse square law, so the centrifugal force of the orbit isn't quite balanced by gravity and there is an *upward* tidal force. Similarly, below the center there is a *downward* tidal force. At locations away from the center but in the horizontal plane (the same distance from Earth as the center) the pull of gravity is the correct magnitude to balance the centrifugal force, but it points in a slightly wrong direction, leading to a net force toward the center of the space station. If one placed a large globe of water at the center of a space station (perhaps to make a spherical swimming pool) the action of tidal forces would cause it to assume a slightly prolate or cigar shape, squeezed in at the equator and stretched along the axis that passes through the center of the Earth.

Q: *How do tidal forces depend on distance?*

A: The basic force of gravitational attraction is an "inverse square law" force. We write $\mathbf{F_g = G\ m\ M\ /\ R^2}$ where **G** is Newton's gravitational constant, **m** and **M** are the masses of the gravitating bodies, and **R** is the distance separating their centers. Tidal forces result from imperfect cancellation of centrifugal and gravitational forces a distance **d** away from the center of gravity of the system and have the form $\mathbf{F_t = G\ m\ M\ d\ /\ R^3}$. The tidal force is therefore an "inverse cube law" force.

Q: *How does the tidal force depend on the other characteristics of the object producing it?*

A: As shown above, the only other relevant characteristic of the object producing the tidal force is its mass **M.** However, for a spherical object with an average density (mass per unit volume) ρ and a radius r we can view its mass as the product of its density and volume, so that $\mathbf{M = \rho\ (4/3\ \pi\ r^3)}$. Then the tidal force has the form $\mathbf{F_t = (\pi/6)\ G\ m\ d\ \rho\ (2r/R)^3}$, so that $\mathbf{F_t \approx \rho\ (2r/R)^3}$. The factor **2r/R** is the *angular diameter* of the object in the sky, i.e., the angle in radians between the lines of sight to the left edge of the object and to the right edge of the object. This provides several useful rules of thumb concerning tidal influences: (1) if two objects have the *same* angular diameter and the same density, they should have the *same* tidal influence; (2) the tidal influence of objects with different angular diameter should depend on the cube of the ratio of angular diameters: twice the angular diameter gives to eight times the tidal influence; and (3) the tidal influence of objects with different densities should depend directly on the ratio of densities.

Q: *Why is the Moon's influence on the tides greater than that of the Sun?*

A: The average angular diameter of the Sun in the sky is 9.30 milliradians or 0.533°, that of the Moon is 9.04 milliradians or 0.518°. In other words, the angular diameters of the Sun and Moon in the sky are almost exactly the same. (The values, of course, vary periodically depending

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on the positions of the Earth and the Moon in their slightly eccentric orbits.) The cosmic accident of nearly-equal angular diameters makes possible solar eclipses in which the disc of the Moon precisely covers that of the Sun. On this basis, one would expect the tidal effects of Sun and Moon to be the same. However, the density of the Moon is 3.34 gm/cm^3 while the mass density of the Sun is 1.41 gm/cm^3. For this reason the Sun has only about 46% of the Moon's influence on the tides.

Q: *What about the influence of other planets on Earth's tides? What about the "Jupiter Effect"?*

A: The planet Jupiter has a density of 1.36 gm/cm^3 and in Earth's sky at closest approach has an angular diameter of 0.227 milliradians. Venus had a density of 5.24 gm/cm^3 and a closest-approach angular diameter of 0.292 milliradians. The maximum tidal influence of Venus is .0053% of that of the Moon and the maximum influence of Jupiter is .0020%, effects on Earth's tides so small as to be essentially unobservable.

The angular diameters of the planets in the sky are very small, with consequently tiny tidal effects. The techno-myth that there should be very high tides and earthquakes when the planets are in the same part of the sky, the so-called Jupiter Effect, is therefore pure hokum.

Q: *Would tidal forces affect a space station in low-Earth orbit?*

A: Yes. There are two important effects for space stations. First, the tidal forces will make any elongated object tend toward an orbit with its long axis pointing to the center of the Earth. Either the space station has to be designed to orbit in this configuration, or an orientation correction system must be included in the design to correct the orientation drift that the tidal forces will produce.

There are also the tidal effects within a space station. About a decade ago, discussion of space-station experiments shifted terminology from "zero-gravity" to "microgravity." This terminology shift was an attempt to more accurately reflect the fact that it is not possible to completely eliminate the last vestiges of Earth's gravity in an orbiting space vehicle. The small residual forces can have important effects on low-gravity experiments.

Q: *What about tidal effects on Earth-like planets of other star systems?*

A: The cosmic accident of a very large moon is unlikely to be repeated for Earth-like planets elsewhere in the galaxy. More typical moons will be likely to have small angular diameters in the sky and a correspondingly diminished influence on the tides. Thus, the tides of such planets are likely to be dominated by the influence of the local sun. Curiously, the bigger and hotter the star is, the less will be its tidal influence. This is because in order to be Earth-like, a planet must be at a distance from the parent star that gives it about the same amount of solar radiation inter-

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cepted by the Earth. The radiation falls off as the inverse square of distance while the tidal effects fall off as the inverse cube.

Thus, a very hot star would be rather far away from its Earth-like planet and have a correspondingly smaller influence on its tides. For example, the tidal effect of Sirius A, a large hot type-A1 star, on an Earth-like planet would be only 1.2% of the tidal influence of the Moon on the Earth. Similarly, Procyon A, type-F5, would have only 4.3% of the Moon's tide in influence.

On the other hand, the tidal effects become much stronger for smaller cooler stars. Tau Ceti, type G8, would exert 1.20 times the Moon's tidal influence on an Earth-like planet. Epsilon Indi, type K5, would exert 4.95 times the Moon's tidal influence on an Earth-like planet. And Barnard's Star, a type M5 star 5.9 light-years away and well publicized by the *Hitch-Hiker's Guide* books, would exert 377,000 times the Moon's tidal influence on an Earth-like planet.

Such a huge tidal force would require that the planet would be tide-locked to its primary as Mercury is to the Sun and the Moon is to the Earth keeping the same face to its primary as it orbits it. Such a tide-locked planet would not very Earth-like. In this case, there would be no tidal stresses as long as the orbit were perfectly circular, but there might be considerable tidal heating of the planet if it were in an elliptical orbit, as is the case with some of the moons of Jupiter.

* * *

Q: *What about the tidal effects near black holes?*

A: Because the tidal force is proportinal to $\rho/\mathbf{R}^3$, when **R** becomes small and ρ becomes large the tidal forces can become very large indeed. A 6 solar mass black hole would have an event horizon with a radius of just 27 km and a density of about 1.45×10^{14}gm/cm^3. If we assume that a 6 foot tall human being could survive a head-to-toe stretching force of about 100 pounds, he could survive at a distance of about 5300 km but would be literally pulled apart by tidal forces if he ventured much closer.

Q: *Is there any way to protect the crew of a space vehicle against dangerous tidal forces?*

A: Dr. Robert Forward described a good technique for doing this in his novels **Dragon's Egg** and **Starquake.** However, his solution required an arrangement of six spheres of ultra-dense matter in a tight orbit around the space station to cancel the severe tidal forces in the vicinity of a neutron star. We would, unfortunately, have to solve the problem of producing such matter before this solution would be feasible.

We should also note that tidal forces cannot be eliminated by passing a space vehicle through the symmetry point between a pair of orbiting black holes, as was suggested in at least one hard-SF novel. In that case, the tidal forces would add, not cancel, and their effect would be doubled. ■

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ANALOG
SCIENCE FICTION AND FACT

CONGRATULATES THE WINNERS OF THE 1992 HUGO AWARDS AND CHESLEY AWARDS

Best Novel (tie)

A Fire Upon the Deep
by Vernor Vinge
Doomsday Book
by Connie Willis

Best Novelette

"The Nutcracker Coup"
by Janet Kagan
(Asimov's, December 1992)

Best Non-Fiction Book

A Wealth of Fable: An Informal History of Science Fiction Fandom in the 1950's
by Harry Warner, Jr.

Best Professional Artist

Don Maitz

Best Fanzine

Mimosa

Best Fan Writer

Dave Langford

Best Fan Artist

Peggy Ranson

Best Magazine
Cover (Chesley)

Michael Whelan for *Asimov's* November 1992

Best Novella

"Barnacle Bill the Spacer"
by Lucius Shepard
(Asimov's, July 1992)

Best Short Story

"Even the Queen"
by Connie Willis
(Asimov's, April 1992)

John W. Campbell Award
for Best New Writer

Laura Resnick

Best Professional Editor

Gardner Dozois

Best Dramatic Presentation

"The Inner Light"
(Star Trek: The Next Generation)

Best Semiprozine

Science Fiction Chronicle

Best Original Artwork

Dinotopia by James Gurney

Best Interior
Illustration (Chesley)

Alan M. Clark for "Poles Apart"
(Analog, Mid-December 1992)

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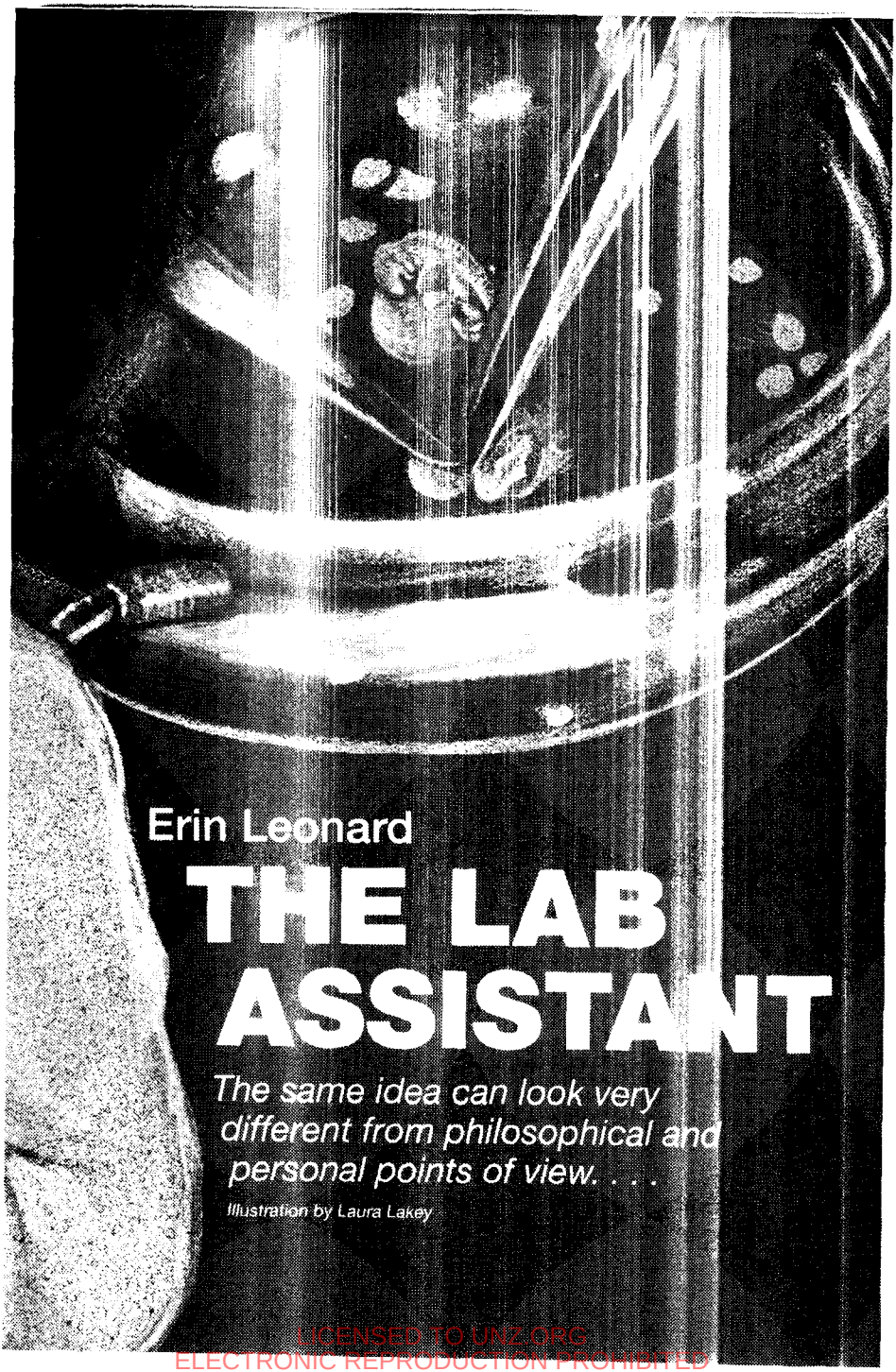

Erin Leonard

THE LAB ASSISTANT

The same idea can look very different from philosophical and personal points of view. . . .

Illustration by Laura Lakey

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" '*The baby is dead.*' " Dr. Gross was quoting from my lab notebook and his eyes were rolling up in his bald skull. It was his way of showing severe frustration. "Ms. Jones, you *must* learn the vocabulary." *I know the vocabulary, Dr. Gross.* "During the first two months (he went on) it is an *embryo.* Thereafter, until birth, it is a *fetus. After* birth, it is a baby, not before. This was an embryo, not a baby. Do you understand?"

"Yes, sir," I said. I knew what they wanted me to say. I knew the words they used. But I knew he was wrong. It wasn't just a complex conglomeration of cells. It was a Pandora's Box of life's meaning. True, at three weeks it was barely visible to the naked eye, and it had a tail and gill clefts. But it was—had been—a baby, and his experimental program—and I—had killed it.

He studied me with his hypodermic needle eyes. "And they don't *die.* They *terminate.* We expect that these next nine specimens will *terminate* likewise within three weeks following fertilization. *That's* what you write in your lab book: '*Embryo terminated,*' and the date, and hour. And then you seal the tube and put it on the shelf. Under actual use conditions, the terminated embryo would of course simply be reabsorbed into the uterine tissues. Got it?"

"Yes, sir." *You're killing babies, Dr. Gross.*

He was still not sure he was getting through to me. He studied me for a moment. I knew what he was thinking. Afro-American female. Exceptional IQ, outstanding scholastic record. Does the wheelchair make her even more diligent? He continued. "This is a very important program, Ms. Jones. You're a genetics major. This scholarship should be easy for you."

"Oh, yes, sir. And I'm glad to have the work. I need the money."

"All right. First, let's make sure you are familiar with the background. As you may or may not know, several agencies in this country and abroad have cooperated to map the entire genome of our forty-six chromosomes. That's a total of some six billion nucleotides, making up over 100,000 genes, each of which comprises 30,000 to 3,000,000 bases. These genes are occasionally flawed, and some of these flaws can result in serious damage to the developing embryo. This prior research has been accomplished at great cost in time and money. For example, it took four years and $10,000,000 to locate the flaw in the gene that causes cystic fibrosis." He looked at me questioningly.

I know all this already, Doctor. That's why I'm here. "Yes, sir," I said.

"Well, then," he said, "let's go over the procedure once more. My Detector is bipolar and bifunctional. First, it seeks out the flaw in the DNA strand, and part of it locks into the strand at that point. The remainder breaks away and seeks out the telomer that caps the DNA strand and protects the strand during replication. This Detector remainder reacts with the telomer and leads it away from its crucial guard position. So now, when the DNA tries to replicate,

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it can't. It simply disintegrates. Within hours the whole embryo is scattered into its individual component nucleotides. I will add the Detector to the nutrient tubes myself, so that you will not be concerned with whether the correct amounts are being used."

I nodded respectfully, and he became expansive. "This will revolutionize genetics, Ms. Jones. Prior to Detector, the next best thing was amniocentesis, which can identify certain genetic abnormalities in the fifteenth week, and can give the parents a terrible choice: birth of a handicapped child, or abortion. My way, Detector decides. The woman simply takes it orally. No moral dilemma for anyone. We'll start with voluntary family planning. Next, it may be used by court order, in lieu of sterilization. After that, it can be used on a larger scale, say in women's prisons, girls' dormitories, and so on. Next, in the village drinking water, and after that, in water systems for cities. Finally, of course, it would be used on a nationwide basis. It can purify an entire race."

"Produce a *Herrenvolk*, doctor?" *Like Hitler?*

"Exactly, Ms. Jones." His voice held neither suspicion nor apology. "Now, there are some five thousand diseases caused by flawed DNA. However, my present budget is limited, and for the time being I can't test the Detector on all five thousand. So I've picked ten, for a pilot program. You've done Number One. If I get terminations for most of the rest, I expect to expand the program to several hundred, and then finally to several thousand. So, let's see what we have. Tube Number Two, ALS—that's amyotrophic lateral sclerosis." *That's Lou Gehrig's disease, doctor. You would have killed the great Yankee before he ever picked up a bat. Not to mention Stephen Hawking, the famous cosmologist.* "Tube Number Three, left-handedness." *Napoleon, Benjamin Franklin, Michaelangelo, Marilyn Monroe, and several million others.* "Tube Number Four, excessive pigmentation." *About half of the population of the world, doctor, including me.* "Number Five, color-blindness. Number Six, cystic fibrosis. Number Seven, MD—muscular dystrophy: here the flaw is a gene that should be making dystrophin, but isn't." *MD? Why do you think I'm in this wheelchair, Dr. Gross?* "Number Eight, sickle cell syndrome. Number Nine, Huntington's chorea, with the flaw in Chromosome Four. And I could go on and on, but for the moment these nine are enough." He looked down at me. "So I hope you can appreciate, Ms. Jones, that my Detector program is a major scientific contribution and has potential for greatly improving the human race."

"Yes, sir," I said. *Like the Black Death improved it.*

There must have been something in my voice that made him look at me sharply. He said sternly, "Ms. Jones, if this pilot program fails, the research center will probably have to go into recombinational DNA to correct the flawed codons, and that will take years and cost millions, much of it at the whim of the federal funding

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agencies. And it would be all quite unnecessary, when my program would solve the problem immediately, at pennies per person." *Only if it works, doctor, only if it works.* "So I shall expect a report in three weeks, Ms. Jones. And I may state in advance, I expect that nine successes will follow this Number One."

Three weeks later he was checking my lab notebook incredulously. "*All still living? All nine?*"

I gave him my most inscrutable face. (I had practiced before a mirror, and it was pretty inscrutable.) "Yes, Dr. Gross."

"Each and every one, still alive?"

"Here they are, doctor." I gave him the tube rack. "All nine, alive and thriving."

He made a gurgly noise way down in his throat. "All right. Maybe we're not giving it enough time. Let's continue for a bit. But not too long. Two months? It would be a one-inch human being, with fingers and toes, wrapped in an amniotic sac, which Detector might not be able to penetrate. Besides, we need an immediate decision. No, let's try just two more weeks with these same nine specimens. At five weeks they'll be about the size of a pea, a nice big target, with all main organs formed and vulnerable. They'll have eyes, a beating heart, a nervous system, and they'll be sprouting little buds that will soon be arms and legs. If we can't kill them by then, we never will."

Two weeks passed, and he came by again. All nine were still alive. Of course.

Poor Dr. Gross sat down, took off his glasses, and wiped first his bald head, then his eyes, then his glasses. He sighed. It was a mournful sigh. It was also one of the happiest sounds I have ever heard. It all depends on the point of view, of course.

"What now, Doctor?"

His voice was so sad I almost felt sorry for him. "I guess we switch over to the DNA correctional program. Too bad, too bad. My Detector would have made everything so simple." He was thoughtful. "Now, as to these nine living specimens, I'm afraid we can't turn them over to the *in vitro* placement bank. No, too dangerous. They started out flawed, and we don't know what happened. We'll have to discard them. Please see to it."

"Of course, Doctor." I exhaled in noisy relief, but he seemed not to notice. I felt bad about killing them, but at least now he would not autopsy them and discover the Jones Detector-neutralizer, and fire me, and start the whole thing all over again.

He said, "And now I have to decide what should be first in the new program."

I said sweetly, "Doctor, I think you mentioned MD. Muscular dystrophy."

"Did I? Well, now's your chance to earn your scholarship, Ms. Jones. I want you to write up the protocol. Use MD as your exemplar. Have it on my desk tomorrow morning." He thought for a moment. "We'll need a lot of money. Ask for—"

"Ten million?"

He blinked at me, and his eyes may have widened a little. "OK. At least it

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won't hurt to ask." He turned to go, then he looked back. "Oh, the one that terminated last month, Number One, what was the flaw in the DNA?"

"Alopecia," I said blandly. "Baldness." I thought of a little bald tadpole, twitching in its death throes, and I poured on the inscrutability.

His mouth opened (but he didn't say anything), then he passed his hand protectively over the top of his hairless head, and he walked away. ■

Make no little plans: They have no magic to stir men's blood.

Daniel H. Burnham

Why are we so much better at answering questions than at asking the right questions? Is it because we are trained at school and university to answer questions that others have asked? If so, should we be trained to ask questions?

Trevor A. Kletz
(submitted by Ron Ward)

One man's perfectly rational and objective decision making may be another man's utter insanity.

Ron Ward

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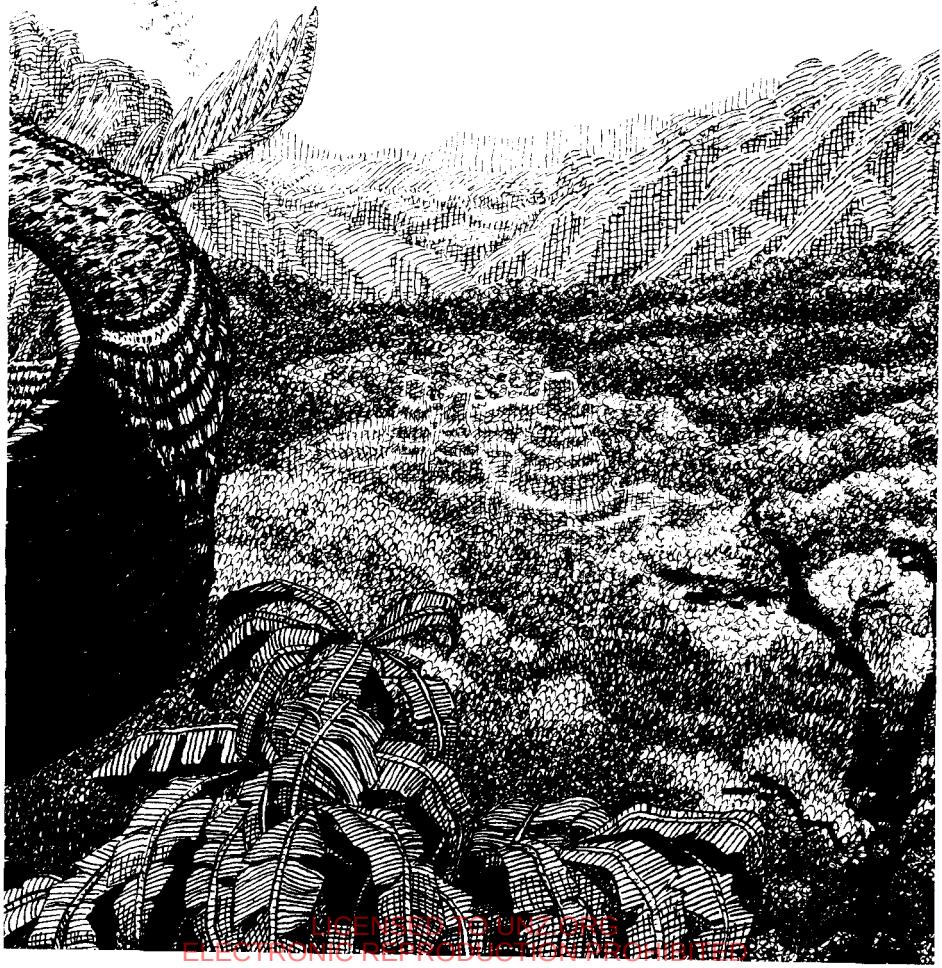
Hayford Peirce

UNDER THE WINGS OF OWLS

Personal experience can badly shake people's faith in principles that seem self-evident in the abstract. And when new tools become available. . . .

Illustration by Janet Aulisio



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"No person . . . shall be compelled in any criminal case to be a witness against himself. . . ."
—the Fifth Amendment to the Constitution, in force December 15, 1791

I

The swirling images were dark, muddy, and chaotic, shot through with jagged streaks of electric blue. They formed and reformed endlessly, slowly resolving themselves into churning blotches of red, white, black, brown, and yellow. The colors quivered and pulsed for a moment that stretched on and on, then suddenly coalesced into a single recognizable image.

It was an enormously fat woman wearing a long red dress patterned with large yellow flowers. In the crook of her arm she carried a small white dog.

The fat woman moved slowly forward until her vast bulk filled all of her vision. Her nose was flat and very broad. Glittering black eyes stared down unblinkingly, and then enormous brown hands reached forward. Fingers worked at the wires and straps that held her to the chair and then she was being pulled into the air and pressed against the swelling bosom.

For a brief moment she caught a glimpse of Mommy and Gramma sitting rigidly in their own chairs. Daddy was also tied to his chair but his eyes were closed, and two people in white were bending over him and pulling wires away. She tried to shout but her mouth was covered by tape.

"Look carefully, little *haole* girl," said the fat woman, "look very, very carefully at what we are going to do to your grandpa, and then to your parents—and then to *you*."

The voice was both soft and thunderous at the same time.

Ignoring her flailing arms, the fat woman pulled her even tighter against her massive breast. "Go ahead," she called loudly, "start it up again: the Woman of the Pit is ready for her awakening."

She tried to hide her face between the flower patterns that covered the fat woman's breasts but a huge brown hand clamped itself around her cheeks and pulled her head around. "I told you to *look*, little *haole* girl."

She had to look. Grampa Sunny was tied to the crystal thing on the wall. Two men in front of him were bent over a thick orange hose that ran out from the wall. The hose jumped in their hands and small red spurts began to trickle from it.

"Here it comes!" shouted one of the men.

Suddenly the trickle became a glowing orange line as straight as a rod. It splashed against the scarred gray wall a little bit to the left of Grampa Sunny.

"Start with his feet," ordered the fat woman, "then—"

"Stop!" cried Senator Loagmeyer. *"For God's sake, stop!"*

The men with the hose and the man attached to the block of crystal vanished from the six-foot screen.

"Are you all right, Mr. Ferron?" asked Dr. Kody. Her birdlike head was cocked as she peered at him with narrow-set gray eyes. Dr. Bodvian,

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her colleague at the Center for Autistic Children at the University of Utah Medical School, sat at the keyboard from which he controlled the screen's nightmarish images.

"I'm all right. It's Senator Loagmeyer who—"

The senator's chest was rising and falling, and her normally ruddy cheeks were pale. "They were really . . . really going to . . . to. . . ."

"Yes, they were really going to," said Sam Ferron, exchanging a glance with Senator Ehrmann.

"And you were going to sit there and watch them—"

"No," said Sam. "I was on my way out, leaving *you* to watch them, Senator. I've seen it before—once. That was enough."

"And yet you want to show this . . . this *monstrous* pornography to the United States Sen—"

Senator Ehrmann shook his freckled bald head in exasperation. "Not pornography, dear colleague, expert *testimony*."

"Ha! That's what *you* call it!" Color had returned to the senator's cheeks and self-assurance to her voice. Tall and thin, the senator from New York angrily waved a hand at the screen. "How do we even know that what we've just seen is really what it purports to be? Computer-generated imaging is so advanced these days that—"

"Surely you're not calling these two distinguished doctors and scientists . . . liars, are you?" Senator Ehrmann's voice was silky.

"I—" Senator Loagmeyer glared at her dumpling-shaped colleague, then extended her look of disgust to the other three people in the book-lined conference room.

Sam Ferron turned away from her glare with barely controlled loathing and reseated himself in a plump leather armchair. She was, he thought, the single most despicable woman in America. Still, he—and all the thousands of people he represented—couldn't afford to needlessly antagonize her. "It's my fault," he said. "I should have warned you that . . . well. . . ." He shrugged apologetically, a muscular, broad-shouldered man a few days short of his thirty-first birthday. He was of middle height, a few inches shorter than the lady senator, with clear blue eyes and tight red curls of wiry hair that had been thinning on the temples and top for some years now.

"I didn't realize they'd made this much progress since you first told me about it," said Senator Ehrmann, gesturing at the screen. "It . . . it's—"

"Just as if you were seeing it through her own eyes?"

"Yes. It was so real that—"

"You felt you were really there." Sam felt his rigidly imposed self-control close to snapping. He really *had* been there. And so had Emily.

And perhaps she still was. . . .

II

Two and a half years earlier, in July of 2036, Samuel Garraty Ferron had gone to the Hawaiian island of Maui. With him was what he reluctantly acknowledged to be his family:

His in-laws, Sunny and Harmony Hallowell, aging but unrepentant

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New Agers.

His wife, Amaranth, freshly back from the shambles of her two-year adventure at an ashram in India, vaguely repentant but certainly no wiser for the experience.

His daughter, Emily, small, blonde, and cuddly, the only one of the four he still loved.

As their rental car moved smoothly up the flanks of Mount Haleakala toward the summit, Sam reflected sadly on the joy he had felt six years before upon his marriage to Amaranth. He had just graduated from college and was madly in love with a passionate, desirable woman who was only the more desirable for being a worldly three or four years older than he. In those days he had considered his new in-laws, Hayden ("Just call me Sunny") and Harmony Hallowell, exotic and amusing. Now he found them ignorant, infuriating—and mildly pathetic. Generous, good-natured, and loving they might be, but to the managing editor of *Inquiring Skeptic* they were only one short step removed from utter lunacy.

Everything that the debunkers' bimonthly scoffed at, the Hallowells actually believed in: UFOs, ESP, Bigfoot, the Loch Ness Monster, alien abductions, harmonic convergences, pyramid-power, reincarnation, and all the other mystical absurdities and flimflams that came so relentlessly across Sam's desk.

And Amaranth! Her name alone ought to have told him how terrible a mistake he was making. . . .

Three years after Emily's birth, Amaranth and her guru had suddenly vanished. A week later Sam received a long, glowing letter from Poona, India, in which Amaranth explained that she had left in order to maximize her human potential.

Sunny and Harmony begged him not to rush into a hasty divorce, promising to do whatever they could to help him raise his daughter. As the semi-impoverished editor of a low-circulation niche magazine, Sam had reluctantly accepted their offer. Sunny was a prosperous college-town neurolinguistic psychotherapist, while Harmony was the independently wealthy proprietor of a New Age consciousness shop that catered to a whole community of educated illiterates. The Hallowells were, in fact, rich. A little money from doting grandparents, Sam told himself, couldn't hurt a man in raising a daughter by himself. . . .

Two years later, without explanation, Amaranth, wan, gaunt, and curiously subdued, had returned from her studies at the feet of her Indian holy man. By then whatever love Sam had once felt for her had long since vanished.

"A reconciliation!" Sunny had boomed, draping a thick, hairy arm around Sam's shoulder. "A second honeymoon! The prodigal daughter returns! Let's give it a try, hunh? For you, Sam—and for Emily. How about a month in Hawaii, first class all the way, all expenses paid? And," he grinned slyly, "I'll even furnish a couple of experienced baby-sitters so that you two kids can have some fun by yourselves. . . ."

But now, after three increasingly

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uncomfortable weeks in the company of Amaranth, in which fun was definitely the last thing they had enjoyed, Sam knew with utter finality that upon their return to the mainland he would file for divorce.

It was cloudy when they got out of their car—cloudy and *cold.* They stood by the lower of the two observation posts in a heavy mist, and peered down at what little could be seen of the ancient crater. In the shifting gray light it was as bleak and colorless as the lunar landscape. Seven or eight dark gray cones of extinct volcanos thrust up from the crater floor. Sam squinted against the mist and wind that swirled around his head. Somewhere down there, he knew, there were actual flows of red-hot lava slowly making their way down to the sea.

"Daddy, I'm cold!"

"And I can hardly catch my breath," added Amaranth plaintively. "No one told me I wasn't going to be able to breathe up here!"

"We're at 10,000 feet," said Sam. "It snows up here in winter. I *told* you it was going to be cold."

"But not like this!" protested Amaranth. "This is supposed to be Hawaii! Come with me, Emily, we're going in that building over there; it's got to be warmer than standing out here."

"Now look down there," said Harmony, tugging at Sam's elbow and pointing into the void. "That must be the cone from the last eruption, you can see the smoke coming out of it."

"I wonder what's going *down* into it," murmured Sunny in portentous tones. He tugged at his short gray beard, jingling the dozen or so large colored crystals that looped his neck and thick wrists.

"Going down into it?" asked Sam, then mentally kicked himself for giving Sunny such an obvious opening.

"You don't *feel* the power up here? Just all around us? Just—"

"I thought Reichians needed lots of blue orgones to generate their power. Not much blue sky up here."

"You've willfully misstated what Reich—"

"Now just stop squabbling, you two," ordered Harmony, "and look at the other cones. The book says they're cinders from the old eruptions and now are like natural pyramids, transmitting and receiving cosmic energies." She peered at the text of the guidebook. "It says they have a high iron content and even form powerful electromagnetic lines directly from the center of the Earth. The strongest point of natural electromagnetism in all of America is right up here at the summit. It's a natural conductor of cosmic energy. And there's a really high focus of radiation coming down out of the atmosphere because of the cone shape of the island—it's just like a great big pyramid. It says that lots of people come up here for spiritual growth and consciousness expansion because of the fullness of its resonance. Isn't that exciting? I really *do* feel all that energy flowing around me! Don't you, Sam? Don't you really?"

"Harmony, the words 'electromagnetic lines from the Earth's center' don't mean anything at all that—"

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"And look," said Harmony, pointing at the map in her book. "Here's a place in the crater called Bottomless Pit—it says that in the old days it used to have tremendous significance for the healing practitioners and the so-called 'black' sorcerers." She shivered delightedly. "Tell me: do you really think that they might be throwing . . . human sacrifices into it like they did at Kilauea on the Big Island?"

"Human sacrifices on the Big Island?" said Sam in an incredulous voice. "Is this more paincult stuff?"

Harmony turned to him with troubled eyes. "Oh, Sam, just because you work for that silly little magazine of yours, why do you have to pretend to be so *skeptical* about everything? You *know* there are wicked, wicked people in the world who aren't in tune with themselves and who can't help but do terrible, terrible—"

"Painlusters? Paincultists? Bloodbathers? Babyeaters? Death—"

"Sam, they *do* exist, you *know* they do!"

"Well, maybe a couple of them. A few isolated sadistic crazies here and there, just like we've always had ever since the dawn of history. But not millions and millions of them all over the world, killing and torturing people by the thousands. All of that is just hysterical nonsense."

"That's not true, Sam! There was a book by an FBI—"

"A nonsense book, Harmony! Completely hysterical! It's just like forty or fifty years ago, when there were books and hysteria about satanic cults and child molestation rings all across the United States. It was all nonsense, Harmony, utter nonsense. It was proven! There was an article in—"

"—Your magazine that proves it." Harmony laughed good-naturedly. "Oh, Sam, you really do take your work too seriously."

"Is it too serious trying to fight superstition by inculcating a little rationality and—"

"But even painlusters have their own rationality," interrupted Sunny in his most pontifical voice. "The ones on Big Island who threw those three young women into the Kilauea volcano actually had a very rational basis for their actions. They were native Hawaiians sacrificing white people—*haoles*—to the volcano goddess Pele in hopes of—"

"And you call that rational?" demanded Sam.

"Compared to other things I've heard in my work, yes."

"So you really believe they've been having human sacrifices over on the Big Island?"

"They've got seven men and three women awaiting trial in Hilo for it right now, my inquiring skeptic. Ask the authorities in Hilo if *they* believe it: they must have had some basis for arresting them."

"Yes, but just because a few dumb Hawaiians stoned out of their minds on *pakalolo* do something that's probably only half as gruesome as a dozen things that's happening on the streets of New York or Los Angeles right at this very minute doesn't mean that there are organized rings of—"

"Daddy, daddy! Mommy and I are *cold!* We want to go!"

Sam turned away in relief from his

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infuriating in-laws. "Don't let Emily hear you talking about bottomless pits," he muttered to them, "you'll only frighten her."

Or hear you talking about any of that other nonsense, he barely kept himself from adding. You might make her turn out to be as crazy as you are. . . .

On the way down from the summit the rental car's autodrive took them off the endlessly looping switchbacks and into the Haleakala Bird Reserve.

First they admired the *nenes,* the state bird of Hawaii, as the sleek, plump creatures waddled across the tree-shaded yard, honking occasionally and pausing now and then to peck for food. Then they strolled through the late morning sunshine to the green wooden building that housed the owls. It was at the edge of the nearly imperceptible mesh that arched high above the trees and pastures of the dozens of acres of the reserve.

"I never seen so many owls!" exclaimed Emily, running from one side of the viewing area to the other. "Look, daddy, there's some more, up there in that tree."

"Yes, all lined up together, just like they were getting ready to talk to us."

"We saw a man who talked with birds once," said Harmony, laying a pale white hand on her husband's arm. "Remember, dear, that man in Paris, in the gardens by the Rue de Rivoli?"

"Say, that's right, I'd completely forgotten about him. That must be thirty, thirty-five years ago. Before Amaranth was born."

"Talked with birds?" asked Amaranth, while Sam tried to keep from sighing aloud.

"Well, he didn't actually say much," said Harmony. "He just ordered them about. We were walking through these beautiful gardens just beside the Seine, when we saw this funny looking little man in ragged clothing walking toward us with one of his arms stretched out to his side. He was shouting something and everyone around him was looking at him. We thought he was just another crazy and started to get out of the way, but then when he got closer we saw that there were about a dozen little birds—"

"—Sparrows," said Sunny.

"—Sparrows flying around his head. Then all of a sudden he shouted '*Right!*' and all of them landed in a line right on his outstretched arm. Just like those owls up there."

"And then he shouted '*Left!*' and all the birds flew up in the air and then landed on his left arm," continued Sunny. "And then he shouted '*Right!*' and they all flew back to his right arm. And all the time he kept walking right towards us."

"And he did that all the way through the park until we lost sight of him," concluded Harmony. "It was really something to see."

"Daddy, daddy!" Emily was tugging at Sam's elbow. "Can people really talk to birds, just like that man who told the birds where to go?"

Sam Ferron sighed softly. "Well, Doctor Dolittle can do it, I guess. And I suppose that if you really wanted to,

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you could train birds to—"

But Emily had skipped away, throwing first one arm to the side and then the other. "Left, right, left, right, left, right!" she shouted at the owls, who sat looking down at her impassively.

"Shh, don't frighten the poor old owls," whispered a park ranger, "they need their sleep, just like little girls." She smiled down at Emily, a powerful-looking, chunky woman in her early thirties. She had golden-brown skin, the broad face of a native Islander, and thick black hair that fell to her shoulders. She wore the dark green blouse and shorts of the National Park Service.

"Do you think you can tell owls which arm to fly to?" Solemnly Emily told the ranger about the funny man in Paris.

"Gee, that's quite a story," said the ranger as she shepherded the little girl back to her parents. "I never heard of birds doing that before."

"True though," said Sunny. "Saw it myself."

"I wouldn't want to try it with some of the birds we have up here on the reserve—they're a little wild and a lot of them have long, sharp bills and nasty claws."

"Why do you keep them in this big cage?" demanded Emily. "Why don't you let them go and fly around where they want to? And be free."

"That's what we're going to do, honey," said the ranger. "Just as soon as we're sure they're ready to take care of themselves. Some of these birds only live here on Mount Haleakala, and when we had those eruptions ten or eleven years ago a lot of their natural habitat was damaged. There are lots of other native birds that live on Maui who had their homes destroyed too, and this reserve is where we're breeding them back. This building here is where the *pueos*, the Hawaiian owls, live when they're not out hunting. We've also got lots and lots of other birds you can see if your folks take you all the way through the reserve."

"Were you here for the eruptions?" asked Harmony. "That must have been exciting!"

"More a lot of work than exciting. There were only two or three little eruptions—all the rest was just flows from newly opened vents."

"But even so, it must have been dangerous!" Harmony's pale blue eyes were round.

"Not really. Once you're above three or four thousand feet elevation, there's no one living on Haleakala, especially on the crater side of the mountain."

"But weren't there pictures of—"

"Oh, there were a couple of old scientific research stations that had to be evacuated, and two of them actually got covered by lava flows at some point. But no one was ever really in much danger except a couple of campers down in the crater not far from the eruption, and we got them out fast enough."

"We didn't see any lava," said Amaranth crossly. "It was too cloudy."

"Up at the summit? Yes, it's socked in most of the time. How much longer are you folks here for?"

Sunny glanced at his wristphone's

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time display and grinned. "Here in the Islands? About another fifteen minutes: we go from here directly to the airport."

"You're going home?"

"Yeah, back to New York State. We'd practically be there by now except our plane broke down in Hong Kong and we decided to come up here to pass the time waiting for it to arrive."

"You're all checked out of your hotel and everything?"

"Ready to go," said Sunny.

The ranger glanced quickly over her shoulder and lowered her voice. "Look, if you want to see some real lava I can show you some in a special viewing site that hasn't yet been opened to the public." She pointed through a window. "It's off past those trees. Want to take a quick look?"

Sam and Sunny looked at their wristphones. "I think we've got time."

"This is really kind of you," said Harmony as they followed the ranger through a densely wooded path. "What's your name, dear?"

"Lokelani—that's a kind of little pink rose that grows here on Maui."

"What a sweet na—"

"Are there any *owls* in these trees?" demanded Emily.

The ranger glanced up into the branches. "Nope, I don't see any *aumakua* today."

"*Aumakua?*" repeated Harmony. "What's that?"

"Well, it's sort of hard to explain, but all those owls back there, all the *pueos*, are supposed to be a kind of *aumakua*. The guide book says it's a family-protecting spirit, a . . . 'a benign and helpful guardian,' I think it says.

" Before the arrival of the white man here in the Islands, the owls would protect warriors in danger. Warriors who were running away could hide under a tree where an owl was sitting and no one could touch him. Then the old Hawaiians would say that he was protected under the wings of an owl." Lokelani shrugged. "It's just an old folk tale."

A small concrete blockhouse became visible through the trees. "It's that building right there," said Lokelani. "The lava flows right through it. I'll just let you in and then . . ."

Sam helped Emily through a narrow door into the gloom of the building, and then felt Amaranth's hand groping for his arm. "Is that you, Sam? I can't see a thing."

"Are you all in?" called Lokelani's voice.

"Yes, but we can't see—"

"The circuit breakers must have gone off. I'll get them on just as soon as I've shut the door. It'll just take a moment."

The door shut with a heavy *thunk*. Metal? Sam wondered as he strained to see anything at all in the now utter blackness.

"Daddy, I can't *see!*"

He squeezed his daughter's shoulder in the darkness. "Hang on, honey. You will in just a moment."

That was when he heard a soft hiss and felt a sudden draft against his face—as if, he thought, something was being vented into the room. . . .

* * *

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III

"What's that, Senator?" said Sam with a start. "I must have been woolgathering for a moment."

The Senator from South Dakota nodded sympathetically. "Yes, I imagine you might when you consider what—" He gestured at the screen. "I was saying that it's my understanding that everything we've just seen, from the time you and your family went up the mountain, on through . . . through that awful—" once again he gestured at the screen, this time shaking his head in dismay "—awful moment we stopped it, all that is exactly what you yourself saw and did?'

"Yes," said Sam softly. "Except that it's all seen from Emily's point of view, not mine."

With a theatrically loud sigh of resignation, Senator Loagmeyer pulled a pocket recorder from her purse and pointed it at Dr. Kody. "As long as I'm here, I might as well get all of this on record. You're not under oath, Doctor, but remember: you could be if you come before our committee."

Dr. Kody scowled impatiently. "Yes, yes, yes, Senator. Just what is it you want to know?"

"Well . . . you say that everything we've been watching here is a computer-generated depiction of the memories of an eight-year-old girl who has been catatonic, autistic, whatever you want to call it, for nearly three years now? Just how is this possible?"

Dr. Kody snorted. "It is possible only with great difficulty. This is, as I've said, an experimental technique developed by this center and based primarily on the work on perceptualization enhancement, with which I gather you are already familiar."

"Up to a point, yes."

"Well, then. Everything you've seen has been generated by the subject, in this case Mr. Ferron's daughter, Emily." She nodded at the shaggy-haired Dr. Bodvian. "With considerable help from the Department of Mathematics, Dr. Bodvian here finally succeeded in applying a Lobachevsky-derived algorithm to the analysis of the magnetic waves generated by the electrical current flowing through the synapses of Emily's brain. This enabled him to train a neural-net computer to take unfamiliar—that is, previously unknown—input and reorganize it into rational output that corresponds to what we believe is objective reality."

"Trained?" said Senator Loagmeyer, scowling. "You make this computer sound intelligent, like you're training an animal."

Dr. Kody nodded. "I apologize —sometimes we do seem to anthropomorphize the damn thing. It's one of the new O-CLIP computers developed by General Electric for research into Artificial Intelligence. We—"

"O-CLIP? What does that mean? Please don't talk jargon to me."

Dr. Kody's lips tightened. "Optical Cell Lattice Image Processor: O-CLIP. The processor in the heart of our computer works entirely by light instead of electricity, performing functions similar to those of a human brain, but millions of times faster. It lets us link Emily into a custom-designed virtual reality system. The

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computer then prods her brain, stimulating the synapses, which produces feedback. It then translates the feedback into digits, processing the digits, and puts them up on the screen in a graphic form that we humans can understand. Its neural-net design allows it to be self-teaching."

"I see. And she's under sedation when you do this? She's not being coached in any way? She doesn't know anything about—"

"She is not being coached or prompted in any way. First she's sedated. Then she is fed tiny computer-controlled doses of psychoactives while we monitor her cerebral activities on practically a neuron by neuron basis. Eventually the feedback begins to create a picture—but only for the computer. Emily herself is completely unaware of the process."

"And thank God for that," muttered Sam grimly, as he thought of his daughter lying wraithlike in a dim hospital room just down the hallway from the conference room. Suddenly, unexpectedly, his heart welled up with black despair. Everything seemed so unbearably hopeless! "And she's still completely catatonic since you recorded this? There hasn't been any progress at all since I was here last week?"

"This *is* progress, Mr. Ferron, remarkable progress. Even a month ago we were completely unable to—"

"But do you really think you'll ever be able to. . . ." His voice trailed off.

"Can't really tell you yet," said Dr. Bodvian gruffly, looking up from his keyboard. "But we've definitely taken the first and most crucial step." He waved a bony hand at the screen. "You confirmed last week, when we watched this together, that we now have a clear and accurate picture of what her brain—at whatever level it may be operating—recalls of what happened in Hawaii. We'll now begin working on using the same process in reverse in order to . . . well, in layman's language, to wipe away the memories so that they're gone forever. And once they're gone. . . . Well, we'll see."

"See what?" demanded Senator Loagmeyer.

"Well . . . if possibly we couldn't rewrite a few—"

"Ha!" cried Senator Loagmeyer, darting a triumphant look at her colleague from South Dakota. "That's *exactly* what I wanted to hear!"

"How do you mean?" asked the doctor warily.

"You know what's going on in the Senate right now, the Judiciary Committee hearings on the Thirty-First Amendment?"

"Mmmm, yes, I think so. I really don't understand why, but according to Mr. Ferron, all that has something to do with why you two senators are here."

"Yes. The two of us are on the Judiciary Committee, which is charged with reporting on this proposed amendment to the full Senate." Senator Loagmeyer pursed her thin lips, glanced from one doctor to the other. "You may have noticed that Senator Ehrmann and I do not precisely share the same opinion on the matter. When Mr. Ferron here asked Senator Ehrmann to see your demonstration,

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my colleagues and I decided I should come along to make certain that no nasty surprises were about to be sprung on us. Now then, what do *you* think about the Thirty-First Amendment, Doctor . . . er . . . Bodvian?"

"I?" Dr. Bodvian tugged at a shaggy eyebrow. "I don't really know," he said finally. "I guess I've spent too much of my life having the Fifth Amendment—no self-incrimination, no testifying against yourself—drummed into me. And then I suppose I've spent too much of my medical life rooting around in people's minds to feel comfortable with the idea of all this stuff here—" he gestured vaguely at the unremarkable equipment of the conference room "—being used by anyone except doctors for strictly medical reasons. Invasion of privacy and all that, you know."

"Invasion of privacy. Exactly! How well you put it, Doctor." She turned to Senator Ehrmann. "I think that was an *excellent* idea you had of bringing me out here. Dr. Bodvian will make an excellent witness for—"

"For what?" said Senator Ehrmann sharply. "All he's said is that he feels uneasy about the issue of the invasion of privacy. A lot of people feel that way. I do myself. But when there's an overriding interest—"

"In torturing people, in wiping out their memories? In rewriting their minds? That's what the Thirty-First Amendment is all about, and that's just what this research here is all about! What do you think the next step will be but the imposition of—"

"What, what, *what?*" Dr. Kody had been sitting on the edge of her chair, her eyes flicking from speaker to speaker like a spectator at a tennis match. Now she jumped to her feet and glared down at Senator Loagmeyer. "What do you mean, that's what this research is all about?"

Sam restrained a sour grin with difficulty. If this loathsome woman thought she might have an ally in Joelina Kody she was sadly mistaken.

"Legalized torture," said Senator Loagmeyer. "That's what the proposed Thirty-First—"

"Nonsense," interrupted Senator Ehrmann, pointedly directing his words to the two doctors. "As you two know better than anyone present, perceptualization enhancement is a completely painless and non-intrusive means of—"

"—*Non-intrusive?*" echoed Senator Loagmeyer incredulously. "You call the forcible administration of drugs and of third-level hypnosis against your will—"

"—Non-intrusive by any *reasonable* person's definition." Senator Ehrmann favored the senator from New York with a courtly nod, then turned back to Doctors Kody and Bodvian. "If you have been watching the hearings at all, you will have heard my colleague here making frequent use of the dramatic and newsworthy word *torture*. What she professes to find impossible to understand, no matter how often the facts are repeated, is that what we are debating in the Senate is absolutely the contrary of those circumstances which existed two and a half centuries ago when the Founding Fathers drew up

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the Constitution and the Bill of Rights."

"Rights which you now want to trample!"

Senator Ehrmann shook his shiny round head in exasperation. "At that time, in the late 1780s, modern police work was nonexistent. Even police forces were largely nonexistent. Torture and other forms of physical duress were the only means available of compelling a person to bear witness against himself. It was for that reason that the Fifth Amendment was so wisely added to the Bill of Rights, as well as the Eighth Amendment with its additional provision against cruel and unusual punishments, and the Fourth Amendment with its protection against unreasonable search and seizure. Together," said Senator Ehrmann, who had once been a professor of constitutional law and still retained his old fondness for lecturing, "these three amendments protect the citizen against what the courts so rightly term *unfair intrusion.* Now, however, 250 years later—"

"We've heard all of this a hundred times already," interrupted Senator Loagmeyer sharply. "I know it all by heart. What I want to know—"

"Is why you're trying to equate perceptualization enhancement with torture?" snapped Dr. Kody at Senator Loagmeyer. "It seems to me that as a United States senator you have the duty to get things *right.* It may be an invasion of privacy to use perceptualization enhancement on a suspected criminal, that's a matter of opinion, but it certainly isn't torture, at least not if it works in any way at all like what we're using right here. The helmet you would put over a suspect's head is nothing more than the receptor by which the computer would determine which brain cells are resisting questions. A feedback loop is established and this loop then automatically regulates the flow of drugs to the relevant areas of the brain so that eventually all resistance is neutralized and the truth is revealed. What's so torturous about that?"

"But the only so-called truth that's revealed is what the subject *thinks* to be the truth," replied the Senator. "Doesn't anyone except me understand this? It doesn't have to be the literal, objective truth! It only has to be what the subject sincerely believes to be the truth! And that can be completely at variance with what really happened! Every first-year psychology student knows—"

"You honestly think that what we've just shown you is *not* the truth?" demanded Dr. Kody. "That somehow eight-year-old Emily Ferron has made this up? Or that we have put it into her brain?"

"As I said, I haven't yet seen any *proof* that—"

Dr. Kody scowled angrily. "All I can say is that if you think perceptualization enhancement constitutes torture, then I suggest you sit right where you are and finish watching what we recorded from Emily's mind. *That* will show you what torture really is—as well as the truth about painlusters, who, it seems, you don't really believe exist."

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Sam's eyes darted to the glowing blue screen and his thoughts to what he had so recently seen there.

IV

Sam awoke with a physical shock that jolted his entire body.

"On your feet, *haole,* let's go!" Something hard and painful smashed against his shoulder. He opened his mouth to protest—and discovered that his mouth wouldn't open.

Panicked, he forced his head up and his eyes open.

Lush green vegetation surrounded him—and two Hawaiian park rangers stood over him, one of them with his boot drawn back as if preparing to kick him squarely in the stomach. Instinctively he raised a hand to protect himself—but his arm wouldn't move. Sam lowered his eyes: instead of the blue and white track suit he had been wearing, he was now wrapped in a cheap brown blanket.

As he struggled to make sense of this, the rangers reached down and jerked him effortlessly to his feet—feet that were now sporting transparent plastic sandals.

He heard a muffled groan behind him and turned to see Amaranth staring at him wild-eyed. Her hair was disheveled and her mouth was covered by gray duct tape. She, too, was wrapped in an old blanket that covered her body like a shroud. Beside her stood Sunny and Harmony; Emily's limp form lay in the arms of a ranger. Behind them was the open end of a battered blue van. "That's the last of them," said a voice from inside the van. "Let's get them moving." Lokelani—the ranger who was going to show them the lava—jumped down from the van and knocked twice on its side. The van lurched forward and vanished into the depths of the tropical forest.

A sudden terrible pain shot through Sam's arm. He turned to see Lokelani waving a shiny silver baton. "Riot control prod," she said with a tight grin. "Turned right up to max. Three or four jolts of this and I can kill you. Now let's get going. I'll use this any time I have to. Just follow Wailuanui there."

They followed Wailuanui through the forest. A pale, diffused light filtered through the thick foliage. Branches and vines were shoved aside by the ranger just far enough to permit Sam to stumble haltingly after him. With his arms bound behind him it was hard to keep his balance. His head throbbed as if from a massive hangover and it was almost impossible to keep his thoughts in sequence. The air against his face was hot and damp and sticky and he knew that they must have been brought far down the mountain.

They came to a sudden halt at a wall of dirty brown stone. Cooled lava? Sam wondered.

The ranger stepped forward into a rough opening that had somehow appeared in the wall. Another jolt of terrible pain arched Sam's back in agony. "Through the hole," ordered Lokelani, "all of you. Hurry it up."

The lava wall was about two feet thick. Sam climbed awkwardly through the hole and stood blinking in the semi-darkness. Numbly he

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watched the silhouettes of the others stumble forward. Emily appeared a moment later in the arms of a Polynesian ranger so broad that he could barely squeeze through the opening. The opening closed and flashlights showed an irregularly arched tunnel ten or twelve feet wide.

"March!"

Oh God, thought Sam, they're taking us down to the Bottomless Pit. They're going to kill us. . . .

The darkness around them was not always absolute. Now and then beams of muted daylight filtered through cracks or fissures in the curved walls or ceiling to briefly illuminate small patches of the tunnel. A few steps later and they would be plunged back into darkness.

A lava tube, Sam realized, suddenly remembering a guidebook's article about Haleakala. The tubes were the occasional result of narrow lava flows. Even while the molten lava continued to run like a red-hot stream, sometimes its surface cooled and hardened. Eventually a hard but brittle shell of rock covered the flow, and then when the flow itself finally stopped the result was a tunnel just like the one they were now in.

Was it possible they had been captured by a *paincult?* Sam hardly dared to formulate the thought.

An interminable time later they came to another concealed opening that led into a second lava tube. This one was even narrower than the first and was utterly dark except for the pools of light cast by the flashlights. Only a few minutes after the rangers had pulled the tunnel's lava plug back into place they were crouched in front of another lava plug. It was pulled away, and once again Sam was pushed through a narrow opening and into almost absolute darkness.

Muffled sounds beside him told him that Amaranth had joined him and was trying desperately to speak. He forced himself to utter what he hoped were soothing little grunts of comfort. Flashlights flickered, and just behind him he could see the rangers working to close the entrance they had just come through.

"All right," said Lokelani, "you can turn on the lights now."

Sam was momentarily dazzled by the explosion of light around him. They were standing in what had once been an ordinary office. A charred desk and chair had been pushed to one corner along with a jumble of papers and books. Part of a concrete wall had collapsed inward under the weight of the flowing lava.

"Get moving," ordered one of the rangers, opening a heavy metal door. Sam obediently shuffled forward. They went a dozen yards along a windowless corridor, then down a stark metal staircase. Another metal door was opened and lights came on.

They were standing in what had once been a windowless, underground recreation room.

Game tables had been pushed against one long wall, along with couches and chairs. The other three walls were decorated with holographic landscapes and seascapes of Hawaii. Beneath the pictures, eight large eye rings had been set into the walls at knee height. From each ring dangled

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a short piece of thick chain. On each chain was a heavy brass padlock.

Once again the agonizing jolt of electricity shot through Sam's back. "On your stomach," ordered a ranger. "Right down there by that piece of chain." Awkwardly, arms behind his back, Sam lowered himself to the concrete floor and tried to make himself comfortable.

Rough hands looped the length of chain around his neck and pulled it tight, then slipped the padlock between two of its links. The lock clicked loudly. He turned his head and seethed with impotent fury as he watched the rest of his family being bound in identical fashion.

"Welcome to the House of Pele," said Lokelani.

The blackness stretched on for an eternity. Tape bound Sam's mouth and his arms were immobilized behind his back.

The chains had been set in the walls so that none of the captives were close enough together to do anything more than barely make contact with their sandal-shod feet. He lay there, half-choked, with the top of his foot awkwardly pressed against the warm flesh of Amaranth's instep.

Finally the lights returned. The tape was ripped from Sam's mouth and he was given a drink of lukewarm water. Before he could speak, fresh tape was applied. The lights went out. Sam pounded his feet against the concrete floor in impotent fury.

Three more times they were given water. Once their soiled blankets were pulled away and replaced with clean ones. All their wristphones had been taken. Even if they were able to tear the tape away from their mouths, they were not going to summon help merely by calling 911. . . .

Once again the lights came on. Five people marched into the room and stood by the abandoned pool table. One of them, handsome and neat in his ranger outfit, Sam recognized as Wailuanui, the Hawaiian who had led them on their march into captivity.

Standing beside the ranger was an enormous middle-aged Polynesian woman wearing a floor-length red muumuu with a pattern of bright yellow hibiscus. A small white mongrel dog was cradled in the crook of one massive arm. She looked down at Sam with cold black eyes.

The other three, two men and a woman, were nearly as dark-skinned as the Polynesians, but something indefinable about their clothes, the cut of their hair, the way they held themselves, told Sam that these were not Hawaiians.

"We're most impressed with your organization, Mama Pele," said the older and thicker of the two men in lightly-accented English. "Especially the way you actually flew some of your own members to New York under their names."

"Thank you, Dom Affonso. It's something we've done before. Lokelani and the others are always on the lookout for possible substitutions."

"Most impressive. May I ask precisely when you plan to deal with . . . ?" He gestured at the captives as if they were no more than sides of beef. "I ask only because the weather

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forecast says that a major storm is in the offing, perhaps even a hurricane. It might disrupt our travel plans."

"We're waiting for the night of the full Moon," said the enormous Hawaiian woman. "That's in three days. So much the better if there's a hurricane—it can only help augment the energy flow."

"You're not worried about a *hurricane?*" asked the other woman. "You have self-contained power here then? I've been wondering how you maintain your lighting and equipment without the authorities—"

"This was originally a research station built by Hawaii Electric in the restricted area of the park in order to study the possibility of harnessing thermal energy from an underground lava source. For their own power needs they built a grid of solar panels all over the immediate neighborhood. When Haleakala erupted in '24, the station was almost immediately covered by a lava flow. It seemed so obvious that the entire installation had been destroyed that nobody even came back to check it out—except us. We found that all the underground installations were still intact—and that we had a secret entrance in by way of the lava tubes. It took a while to hide enough solar panels and bring their lines in, but eventually we did." Mama Pele shrugged massively. "So that's how we have power. Not a lot, but enough for our needs."

"Remarkable, really remarkable," said the younger of the two men with the same accent as his two companions.

"As soon as our project is brought to fulfillment and we have been rejoined by the Woman of the Pit," said Mama Pele, "we will no longer need this facility. The millions of tourists who crawl around the hillside, and all the rest of the *haole* usurpers, will be swept away into the Bottomless Pit and Hawaii will once again belong to the Hawaiians."

The three visitors—Brazilians? Sam wondered—exchanged brief glances. "Yes," said Dom Affonso. "That is a remarkably exciting prospect."

"We are nearly there. Perhaps even with these. . . ." Her cold black eyes moved from one captive to the next. "We shall see on Wednesday night."

Sam fell back on the floor, too full of despair to be able to make eye contact with anyone else in the room.

They really *had* been captured by painlusters.

V

"When I testified before your committee that there are thousands, perhaps millions, of these people out there all over the world," said Sam to Senator Loagmeyer, trying to keep his temper under control, "you clearly didn't believe me."

"Why should I believe you and your figures?" demanded the Senator defiantly. "I have the greatest possible sympathy for what happened to you and your family. But on the other hand, you freely admit that you're nothing more than a professional witch-hunter from this hate group of yours who—"

Sam could bear it no longer. "If you have honestly interpreted my testi-

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mony on behalf of DEPLORE to include an admission that I am a witch-hunter representing a hate group, then you are too stupid to bother talking to."

"Mr. Ferron, Senator Loagmeyer is anything but stupid," said Senator Ehrmann, turning to his colleague, "which makes one wonder just why you *are* so interested in protecting these painlusters?"

"I am *not* trying to defend them, if indeed they exist in anything except the most insignificant numbers! I am merely trying to defend the Constitution of the United States and the rights of the people of the United States! And I deeply resent your insinuation that I myself might be—"

"My dear lady, the committee has heard ample testimony from a variety of expert witnesses, including the FBI, who have testified to the vast numbers of sadistic, organized killers hiding among us. Why they exist is not for us to judge. As senators we must act to protect our country and its citizens. And yet you now refuse to look at first-hand testimony proving the existence of—"

"Murderers and other monstrous criminals have always existed, and always will," snapped the senator. "I've never for a moment denied it. And of course our citizens must be protected from them. But there is absolutely no reason for us at this particular moment to suddenly throw away our most cherished liberties merely in order to—"

"—finally wipe out capital crimes once and for all?" demanded Sam. "These terrible crimes are happening to other people even as we sit here and talk about it. You can call me a witch-hunter, but—"

"Well, that's just what you are!"

"A witch hunt, Senator—by definition—means hunting and persecuting *innocent* people. We want to hunt and *legally* prosecute *guilty* people. Monsters in human form who *do* exist. The difference between a *rat* hunt and a witch hunt is that for the first time in history we have the means of *knowing* when our monsters are guilty. Look what the Italians did when they finally got serious about the Mafia and went after them with perceptualization enhancement: they wiped them out in three months. There isn't a Mafioso left in Italy. And no one in Italy is complaining about the invasion of privacy or the persecution of innocent people."

Dr. Bodvian cleared his throat into the silence that followed and turned to Sam. "You yourself wouldn't mind some policeman poking around in your own mind to determine whether or not you're a monster?"

"Why should I mind?" said Sam doggedly. "*I'm* not a monster. The only people who'll object are those who are."

"And those few civil libertarians who still remain," said Senator Loagmeyer wearily, gathering her belongings and climbing to her feet.

"In that case," replied Senator Ehrmann, "I can only hope that the rest of the committee will not share your response when they view this recording."

"I promise you, Senator, I shall do everything I can to prevent this por-

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nography from ever being shown to the committee." She turned to Dr. Kody. "And if you and your center here persist in your attempts to perfect a means of brainwashing perfectly innocent people and of installing false memories in them, then I shall do everything I can as a member of the United States Senate to stop both you and your so-called research." The door slammed shut behind her.

"That is a very troubled person," said Dr. Kody after a moment's silence. "She clearly has difficulty relating to reality."

"I entirely agree, but she can cause an enormous amount of trouble," said Senator Ehrmann with a small sigh. "No matter how incompetent we may be, nothing in the world can match a determined United States senator when it comes to causing pure hellacious trouble."

Trouble. As Senator Ehrmann graciously took his leave, Sam thought back to his experience in Hawaii. . . .

VI

Even this far beneath the surface they could hear the wind howling. Somewhere above him, Sam knew, a tropical hurricane must be scourging the island.

While lying in the darkness of the recreation room turned prison, Sam had felt that it would be impossible ever to be more scared than he was then. Now he saw how wrong he had been.

They sat in tall metal chairs that had been specially built to hold prisoners. His arms and legs were secured, and his head was strapped tightly against a contoured headrest. Amaranth was in a similar chair to his right, his mother-in-law in one to his left. From the corner of his eye Sam could catch a bare glimpse of Sunny's shaggy beard a little beyond Harmony's shoulder. Emily was somewhere behind Sunny. After four or five days without food, she already looked gaunt and half-starved. Or perhaps that was only the terror Sam saw in her eyes.

The howl of the wind was nearly drowned out by the cries and squawks of dozens upon dozens of birds. They lay trussed on the floor, flapping helplessly in front of the burlap bags from which they had just been dumped by four Islanders. Dom Affonso came forward with fifteen more Brazilian painlusters. He picked up a Hawaiian goose and examined it critically. Then he turned and handed the loudly honking bird to a neatly dressed child no older than Emily. The little girl turned the goose over in her hands, studied it carefully, then tossed it back into the writhing mass of birds. She pointed out a frantically hopping owl to Dom Affonso, who grinned and ran his hand through her glossy black hair.

The little girl was led back to a group of two dozen Polynesians sitting in wooden chairs. Here she climbed into the lap of a strikingly beautiful Brazilian woman who hugged her warmly. Nor was she the only child present. Sam sagged in his chair, numbed by the revelation that so great an evil could exist in this day and age. Maybe the churches were

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right, he thought, those few that still remained. Maybe there really *was* a Satan. . . .

Sam and his family sat in the high-ceilinged room that had once been the station's research center. Windowless, it was impossible to tell how far beneath the surface they really were.

Nor was Sam able to identify much of the paraphernalia that filled the laboratory. All he knew with any certainty was that this madwoman Mama Pele and her cohort had done everything possible to take whatever equipment the technicians of Hawaii Electric had left in their flight and to convert it to the most ghastly travesty of legitimate science.

Mama Pele stood in front of a seven-foot block of flawless, glittering crystal. Elongated and octagonal, it was attached to the high concrete wall behind her. The wall, pitted and fire-scarred, contrasted sharply with the crystal's glowing blue translucence.

"This," explained Mama Pele to her audience of Polynesians and Brazilians, "is our altar. And this is *ka wahine o ka lua*, the Woman of the Pit." She raised a hand to the ten crystal pyramids that floated in midair just above her head. As transparent as the altar, they pulsed with a rich, glowing, lemon yellow. The apex of each pyramid was pointed toward an insubstantial red form that hung in the air between them. The form flickered and faded with an irregular pulse and seemed to be moving as if to the gusts of a gentle breeze. But in spite of its nebulosity, the shape was clearly that of a naked woman with long, undulating hair.

A holographic image? wondered Sam.

"She is also known as Pelehonuamea, the Sacred Earth Person, but all of us prefer to call her Woman of the Pit. The miserable *haoles* with us tonight should feel honored to be allowed to aid in her substantiation." Mama Pele pointed to the six pyramid-shaped crystals the size of an egg that had been attached to each of the captive's limbs, torso, and head. Thin silvery cables snaked from the crystals across the floor to a console packed with instrumentation. From there, ten thicker cables led up to the yellow pyramids that surrounded the Woman of the Pit. "As you can see, she has already been substantially revitalized. The cosmic energies and magnetism here in Haleakala are unequalled anywhere on Earth. Combined with what we derive from our sacrifices it will not be long now."

"Yes, so we see," said Dom Affonso, from where he was inspecting a panel of glowing monitors. "It is all most scientific."

Mama Pele nodded at the half-dozen Islanders in white smocks who moved about the laboratory. "As you see, we closely monitor the subjects' body functions, brainwave activity, energy outputs, and so forth. At the same time, these wires channel their life forces through the focusers as they watch the others being sacrificed."

"Hmmm. And the focusers are . . . ?"

"These ten yellow crystals you see

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above me, two for each *haole*. The focusers direct their life forces directly to *ka wahine o ka lua*."

"Most impressive," said Dom Afonso with a baffled shake of his head. "But the sacrifices themselves? How—"

"There is actually an open pit of lava directly beneath us. This is what the electric company was trying to tap. Initially we tried to make our sacrifices directly into the lava, but it was too deep and access was too limited to be practical. Eventually our technicians produced the method you are about to see. It is less traditional, of course, but much more scientific." Mama Pele looked up to the nebulosity that was the Woman of the Pit and nodded in satisfaction. "Much more scientific. And in any case, *she* approves."

Mama Pele shepherded the Brazilians back to a row of wooden chairs. "Make yourselves comfortable, we are ready to begin." She snuggled her small white dog into the crook of her arm. "One thing we have clearly established over the years: greater life forces are concentrated in the young. Therefore the oldest shall be taken first and we will work our way down to the child. Perhaps by then the Woman of the Pit will have rejoined us. And when she does, *then* we shall see whose goddess is stronger—ours, or that of the *haole* usurpers. . . ."

Two of the white-smocked Hawaiians dragged a foot-thick orange hose away from a wall while a third pulled out a crude metal tripod. Black handgrips had been attached to the hose just before it narrowed to a long, stainless-steel nozzle. The end of the hose was lifted onto the tripod, where it was fixed in place. Its nozzle now pointed directly at the fire-scarred wall.

Sam watched helplessly as three more bulky young Islanders pulled Sunny away from his chair, stripped him of his blanket, and dragged him to the crystal altar. When he had been attached by transparent straps, Mama Pele and Wailuanui stepped forward. Together they supervised the Islanders in attaching ten frantically wriggling birds to Sunny's naked body.

Three of the Islanders pivoted the altar on an unseen mechanism so that now it stood upright against the fire-scarred wall. Sunny's gag was pulled away. He looked around the room with calm, apparently indifferent eyes. "Goodbye, my darlings," he shouted above the wind and shrieks of birds, "I love you and—"

A tentative spurt of molten lava splashed against the wall not far from the altar. Sam twisted helplessly in his chair, his heart pounding in his chest. If only—

Power surged through Sam's body, slamming him back against the chair, then pulling him forward. He felt his consciousness expanding like an orange fireball and then—

Nothingness.

Sam came suddenly to his senses. He was lying on the concrete floor, looking up at the ceiling. Tentatively he wriggled his arms and legs. The wiring and bonds had been removed from his body, his blanket stripped away.

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"He's back!" a voice shouted above the howl of the wind. Five Polynesian faces moved into sight and looked down at him. "He's still alive!"

"Hard to believe," muttered one of the Islanders. "I've never recorded such an energy surge before."

"You mean you've never recorded one that ran *backwards* before," said a third voice. "I told you that the wiring had—"

"Never mind about the wiring, everything's all shorted out, we'll see about it tomorrow." Mama Pele's curiously breathless voice cut across the other's. "Just get him onto the altar. Look at the Goddess—she's almost here, even without the focusers. One or two more and. . . ."

Sam was pulled to his feet. He felt light-headed but ridiculously, impossibly strong. He knew that he couldn't possibly be, that lying bound with nothing to eat for five or six days had left him as weak as a rag doll. But that wasn't how he *felt*. He felt ready to pull Mama Pele's arm from her shoulder and use it to beat her to death with, to—

His eyes met those of Emily.

She was standing in the first row of spectators, clasped tightly against Mama Pele's enormous breast. Mama Pele's small white dog peered out from the crook of her other elbow.

Sam's gag had been pulled away from his mouth, along with the wiring. "Emily," he croaked, the first words he had spoken since walking into the trap in the bird sanctuary. "Em—"

The howl of the hurricane rose to a screech and the entire building seemed to shake before its fury. Mama Pele lurched to her feet, and for a moment stood looking quizzically up at the ceiling.

As the shriek rose even higher, Sam saw Emily break away from Mama Pele's embrace and run awkwardly toward him.

Mama Pele's enormous bulk waddled after her, while two of the Islanders holding Sam moved to cut her off. But now Emily had changed direction and had reached the unattended lava hose. Sam saw her small hands fumbling clumsily at the lever that activated the jet of boiling lava.

Four Hawaiians charged her.

Now only two Islanders held Sam. He lurched to his right with a maniac's strength, then back to his left, and then to his right again. His elbow smashed a nose, his knee smashed a groin. He pulled away from faltering grips, began to run to Emily.

Too late. Already she was in the grip of two Islanders. "I'll be back, Emily," he screamed over his shoulder as he whirled and fled in the other direction, "I'm going for help. Don't—"

People were converging on him from all directions. Hardly breaking stride, still fueled by the manic strength he had awakened with, he kicked a Brazilian in the stomach and jabbed a thumb in the eye of a female Islander. The entrance to the hallway was just ahead. A wild-eyed Brazilian filled it, his hands twitching uncertainly as he watched Sam bear down on him. Sam's legs pumped furiously. If only he could get by this last pain-luster, somehow get to the room

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where—

Something brown and sleek blurred past Sam's shoulder and, with a harsh screech, attached itself to the horrified face of the Brazilian. As he brushed against the screaming figures, Sam saw that the painluster was being savaged by a frantically flapping owl whose bonds must have come loose. Sam's hands grabbed at the Brazilian's wrist, groped futilely for a heart-stopping moment, then succeeded in tearing away the painluster's wristphone.

The priceless trophy clutched to his chest, Sam ran breathlessly down the hallway. Panicked shouts followed him. He passed a staircase, a door, another door, a—

That was the one!

He pushed the metal door open, stepped into the darkness, then slammed the door shut and threw its bolt home just as something heavy thudded against the other side. The thuds intensified, were joined by loud shouts.

Sam stood in utter darkness, his back pressed against the door. His fingers fumbled with the wristphone and finally located the activator. He raised it to his lips and took a deep breath. "Nine one one," he said slowly and clearly, "nine one one, this is an emergency. . . ."

Something hard and metallic smashed against the door as he finished speaking. The door trembled against his back. Somewhere above him the hurricane howled.

How much longer could he stay here before they broke the door down? Without a weapon, there was nothing more he could do to save Emily and the others. Either the state police would get here in time or they wouldn't. . . .

Sam groped for the light switch beside the door and finally located it. When the lights came on he blinked for a moment, then frantically searched the room for a weapon of any kind. There was nothing but a charred piece of wood that had once been part of a chair. By this time he found himself against the lava flow that filled one side of the room. His hands moved across the rough stone, searching for the plug. The howl of the hurricane grew louder. He found a crack, used the piece of wood to pry at it. The plug came away suddenly and unexpectedly—and Sam was thrown to the floor by an explosion of screaming demons.

It was only when the room was full from floor to ceiling that he realized that the demons were thousands of shrieking birds. He shook his head like a punch-drunk fighter just as the door was pried halfway open by three Hawaiians wielding crowbars. They fell back in sudden horror. With screeches that drowned out the howling of the storm, the birds poured into the corridor.

Sam struggled to his feet and concealed himself behind the door as an unending flow of screaming birds pressed through from the lava plug and into the research station. Somewhere nearby he heard cries from a human throat.

Eventually the torrent of birds slowed to a stream and then to a trickle. Armed with his makeshift

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club, Sam stepped cautiously into the corridor.

As he limped back to the torture chamber he was forced to step over six mounds of rags and flesh that had once been human beings. Two of the mounds still had birds pecking at them. At the end of the corridor he could see nothing but a swarm of wings filling the room. Emily was somewhere in there, and Sunny and Harmony and Amaranth. Somehow he had to get them out before they were torn to pieces by the birds.

He fought his way into the room, waving his club to fend off the birds of a dozen different species. Their screeching was almost unbearable. But even above their noise and the howling of the wind he could clearly hear the screams of terrified human beings.

Eventually he reached the chairs to which he and his family had been bound. They were empty. Despairingly, he swung around and tried to make sense of the hellish scene before him.

The swarm of birds was by far the thickest to his left, where earlier the painlusters had gathered to watch the proceedings. Sam stared in numb amazement. Thousands of howling birds milled and swooped above what had once been three dozen human beings. Nothing human seemed to be moving except a single arm waving in agony.

Where was Emily?

On the altar?

He swung his eyes frantically around the room. No, there it was, empty, thank God!

Then—

Three blurry shapes, people covered by birds, broke free from the chaos and staggered across the floor. Two of the shapes lurched drunkenly toward the lava hose clamped to the tripod on the far side of the room. Sam grinned savagely and raised his club. He was going to enjoy this. He took a step in their direction—then suddenly stopped.

The third staggering figure was Mama Pele. And clutched against her body by one massive arm was Emily. Birds, red, white, black, and gray, surrounded the Islander's head and shoulders. They pecked and tore and ripped. Mama Pele howled in agony and waved an arm to which three brown and white owls were attached.

Beside himself with fury, Sam heard his own hellish scream. He ran forward, hesitated, then clubbed Mama Pele's ankles with all his strength. For an instant her glittering black eyes met his in wonder, and then she toppled to the floor. As she fell, Sam pulled Emily away and into his arms.

The Islander disappeared from view beneath the frenzy of a hundred birds of a dozen different species. . . .

Gasping and wheezing, Sam stood in an agony of indecision with Emily nestled against him. There was no sign of Amaranth or her parents. What—

Suddenly he saw that the two other Hawaiians, though still covered by ravaging birds, had managed to activate the lava hose. As its molten arc swept across the room, charred birds by the dozens began to fall to the

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floor. The dozens became hundreds.

But the Islanders were unable to fend off the cloud of birds that once again hid them from view. With a final cry of pain, one collapsed heavily against the other. Together they fell to the floor, pulling the tripod with them.

The stream of glowing lava arced up across the ceiling, then slashed down and across the chaos on the other side of the room where the audience of painlusters had once been seated. The molten jet moved slowly across the mass of frenzied birds—then suddenly jerked down and sideways with appalling speed.

Straight toward Sam.

Sam lurched to one side while sweeping Emily up against his chest. Eyes wide, he saw that the molten jet was nearly on him. He timed it as best he could, jumped—

The lava slashed across Sam's ankle like a red-hot knife, neatly severing his left foot.

Sam fell to the floor, dimly aware through his agony that Emily was no longer in his arms.

Somehow he levered himself to his elbows, willing himself to stay conscious. Above him the birds swooped and shrieked triumphantly.

His rapidly dimming eyes moved on.

Just before he lost consciousness he saw her. Emily lay huddled on the floor a few feet away.

Sitting on her shoulder, its beak and face red with blood, sat a large brown and white owl. Its round yellow eyes stared back at him unblinkingly.

* * *

VII

"I understand that it was a pretty grim bunch of senators who saw that recording," said Sam to Senator Ehrmann five weeks later. The senator was passing through Utah on personal business and had unexpectedly called Sam. Now they stood in the hallway just outside the hospital room in which Emily had lain so silently for month after month. Inside, Dr. Kody and three other doctors were examining her.

"Grim and *upset*," agreed the Senator. "Even with the editing we did, it was still . . . powerful stuff. That's why none of us fought very hard to keep it from only being shown in closed session."

"Even so, Senator Loagmeyer and her little group fought its showing tooth and nail."

"That they did, Sam. They knew that Emily's recording was the final nail we needed to secure passage. I'm afraid you've made a powerful enemy in that woman, Sam, you and all the good people in this center."

Sam nodded somberly. "I suppose so. But I won't worry about it. Just as long as she doesn't turn out to be a—"

"Painluster herself?" Senator Ehrmann pursed his lips. "I'd hate to think there was one of those devils in the United States Senate but . . . well, they seem to be everywhere else. . . ."

"They won't be for long," promised Sam with grim relish. "Just as soon as the amendment's ratified by the states and the equipment becomes generally available—the rat hunt will begin

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in earnest."

"I understand that you're moving to Hawaii?"

"At least for a while—and depending, of course, on Emily's condition. I have a personal stake in that part of the world."

"Yes." The senator shook his head dolefully. "A tragedy, an utter tragedy that . . . that. . . ."

"They were too late to save my wife and in-laws? Yes," said Sam, with lowered eyes. "They . . . they were . . . dealt with while I was unconscious from that power surge. But they made Emily watch it all, even though all their so-called focusing equipment had shorted out. Mama Pele came and got her personally. I'm not going to forget that, Senator, not *ever*."

Senator Ehrmann shuddered at the memory of the recording. His eyes moved to the plain white door that separated them from Dr. Kody. "This treatment that Dr. Kody has been using with Emily—you say she's made a lot of progress with it since the last time I saw you. You don't think that perhaps Dr. Kody could use it to—to—"

"Wash my own mind of everything I saw in Hawaii? Maybe even put in some brand-new memories? I don't want new memories, Senator, I *want* to remember—at least until I've seen the last murdering painluster in his grave!"

The senator turned away from the raw emotion in Sam's voice. He suddenly pitied anyone, even a painluster, who had this single-minded man as his sworn enemy. "Can't say as I blame you. By the way, how's the foot?"

"The *foot?* Oh, the one that got cut off." Sam lifted his left leg and flexed his foot vigorously. "Sometimes it tingles a little, but most of the time I completely forget it's not real—I can even play tennis on it."

"Remarkable."

"And lucky. The lava that chopped it off also cauterized the stump so that I didn't bleed to death."

"Lucky." The senator sighed. "Poor Sam, so unlucky in some ways, so lucky in others. Yours is a remarkable story. I feel honored to have met you." He drew closer, lowered his voice. "But how *did* those birds get there, Sam? To me, that seems to be the only genuinely authenticated miracle I've ever heard of." He smiled wanly. "But then, of course, as I've already told you, I'm a religious man, one of the few of us that's left."

"Believe me, Senator, I've thought about that long and hard. All I know is that when I came to for the second time, Emily was tugging at my good foot and the birds were still flying around. And after a while the state police came." Sam shrugged. "They told me afterwards there'd been the mother and father of all storms, Hurricane Aaron. It ripped through the bird reserve, destroying the buildings and nesting areas, carrying away thousands and thousands of birds. Logs and trees and rooftops were flying through the air like leaves. The debris broke dozens of holes in the lava tubes that ran past the research station. The police figure the wind must have carried the birds straight

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down the hillside to the tubes, where some of them managed to get inside for protection. I inadvertently let them into the station. By that time, of course, they were maddened by the storm to the point of murderous frenzy."

"Hrmph. So you're saying it was all just happenstance?"

Sam stared off into the distance. Finally he shrugged. "I ran that magazine called the *Inquiring Skeptic* for five years because I believed in what I was doing, Senator. I'm still a skeptic—but I have to admit I'm not as much of one as I was before. As you say, that's an awful lot of happenstance. On the other hand, what else *can* I believe?"

That he could command the flight of birds like that man in Paris Sunny had told them about?

Or—that *Emily* could?

Senator Ehrmann looked down at the backs of his hands. "No, what else can we believe? Particularly in this age of nonbelievers." He shook his head. "And there was no one else left alive?"

The words took Sam back to the hellishness that was never far from his thoughts. Once again he saw Emily tugging despairingly at his foot. The birds soaring. The police arriving. The pile of mangled remains of dead birds and dead painlusters being pulled apart. Himself being carried by on a stretcher. And suddenly looking directly into the large brown eyes of a six-year-old child a few feet away.

Only her blood-streaked face was visible among the other bodies.

And then the eyes blinked. And blinked again.

Sam moaned from the very bottom of his soul—how could there be such evil in the world?

"Alive?" he murmured. "Alive? Just the one little Brazilian girl." He heard his voice as if from a great distance. "I don't know what finally happened to her."

"The devils." The senator sighed heavily. "Imagine doing that to a child."

"After that, you know," said Sam softly, his thoughts still far away, "I guess I passed out again. I . . . I've always thought that as I was carried out . . . there was an owl sitting on my shoulder."

"An ow—"

"You can come in now, Mr. Ferron, Senator Erhmann," said Dr. Kody softly. "Not for very long: she needs to rest."

Sam shook the cobwebs from his mind and strode across the room. He nodded to the three doctors who stood at the foot of the bed with solemn faces. One of them had just finished removing a monitoring device from Emily's head. Sam looked down at his daughter. She lay just as he had known her for three years now, wan and motionless. She wore a blue and yellow gown and her silky blonde hair was fanned out against the pillow.

Sam turned to the doctors. "What do you think—"

Emily's eyes opened. Her hand stirred and reached for Sam's.

"Daddy," she said in a small but clear voice. "I was dreaming about owls, a *wonderful* dream. Can we go to the zoo and look at the owls?"

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* * *

"The Fifth Amendment is hereby modified to the extent that no person shall be compelled in any criminal case to be a witness against himself... except in capital, or otherwise infamous crimes when that testimony shall be obtained solely by means of perceptualization enhancement, the use of which shall be regulated by the Congress...."

—the Thirty-First Amendment to the Constitution, passed by the Congress on April 29, 2039, ratified by the States and in force November 26, 2039. ■

TOP TEN PHRASES HEARD IMMEDIATELY BEFORE "THE BIG BANG":

1. Trust me.
2. What does this button do?
3. Help me get the lid off this thing.
4. Remember, this is still experimental.
5. Where does all this stuff *go*?
6. Sure, it's safe to mix these!
7. It's only dangerous if you drop it.
8. What could go wrong?
9. Let me handle this.
10. I don't feel so good.

—Paula Robinson

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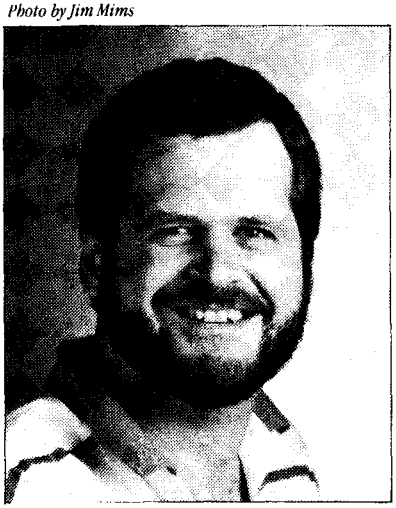
BIOLOG Jay Kay Klein

Doug Larsen started life with a cliché, a Danish surname from Minnesota. Then there was a B.A. from St. Olaf College, Northfield, MN in English and political science. When a thesis is accepted, he'll also have an M.A. from the University of St. Thomas, Minneapolis, MN, in business communications.

Photo by Jim Mims



Doug Larson

Naturally enough, Doug works in Minneapolis, as manager of marketing communications for the city's Federal Reserve Bank. Since he writes sales support materials during business hours, and science fiction in off hours, he considers himself a full-time writer. Just as naturally, he started reading SF with Isaac Asimov. His reading has been kept up to date, with a great liking for contemporary *Analog* authors Michael F. Flynn, Lois McMaster Bujold, and W.R. Thompson, among others. He finds Amy Bechtel's stories so moving that reading them provides sorrow mingled with pleasure.

Writing for Doug started in the fifth grade. After a page of one assignment, he was overwhelmed by actually having created something. He decided, "That's what I want to do." It's been pointed out by numerous persons that facing death concentrates the mind enormously. At 25, Doug was diagnosed with cancer. Science that is the underpinning of SF enabled him to beat a formerly fatal type of neoplasm. Eight years later, two of three vital drugs new then and an anti-nausea medication have already been superseded, with a survival rate now reaching 95 percent.

Given a reprieve after a year in the cancer wards, it would be easy to

(Continued on page 300)

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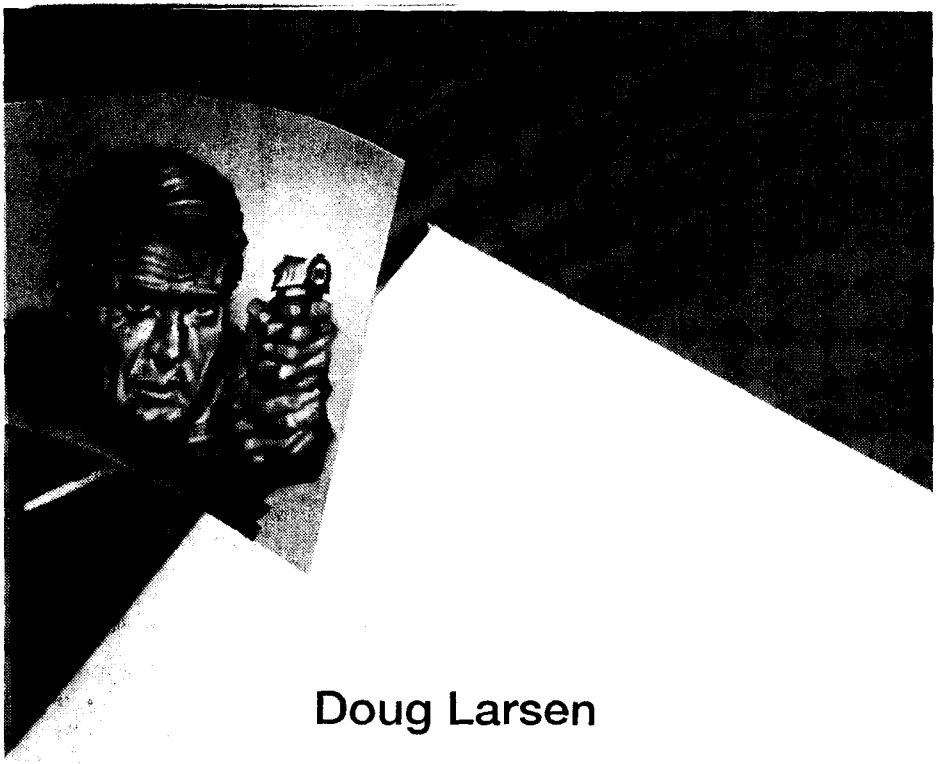

Doug Larsen

VIRTUAL PROOF

When simulations become indistinguishable from reality, you get a whole new set of options—and problems!

Illustration by Gary Freeman

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Part One: MEANS

The van pulled over to the side of the road. Alex Roberts pulled up behind it and got out, leaving his police lights flashing. He approached the van cautiously, keeping an eye on the driver's door.

Suddenly, the back door of the van burst open, and a masked gunman jumped out. Shit! Roberts jerked his gun up, and fired at the same time as his assailant. Roberts's round clipped the man's elbow. The gunman caught him square in the chest. Lights exploded before Roberts's eyes, and he staggered backwards. With contemptuous leisure, the gunman fired three more times. Roberts went down, and everything went blank.

In the distance, a voice chuckled sardonically. "You're dead," it said. Someone else laughed rudely.

Roberts lay there, breathing rapidly, doused with sweat. He knocked the helmet off his head and blinked as he adjusted to the room he was in and the two smirking technicians sitting in front of the instrument board.

"Gets 'em every time," one of the technicians said. "The ol' back-of-the-van trick."

"Takes you down a peg or two, doesn't it, Sarge?" the other one smirked.

Roberts was breathing heavily, and checked to see if all of his appendages worked. "Assholes," he told them.

They laughed. "Hey, just be glad it's not real life," one of them said.

"Yeah. If you run across a van in real life, you'll thank us," the other added.

Roberts was still shook up. "You didn't have to make it feel so real," he griped.

"That's not up to us," one of them said.

"Yeah, right." Roberts was wrestling out of his wired suit.

"Hey, you're not done yet," the first technician complained.

"Go to hell," Roberts snapped, and strode out of the room.

Lois McNeil moved the rudder mechanism carefully, and the tiny submarine moved slowly into the diseased lung. Its headlights cast a harsh light on the dark spot that filled the center.

"Burn in hell," McNeil muttered at it, and activated the weapons system. Crosshairs appeared in the cockpit window, and she chose a slightly magnified view. Then she took hold of the aiming controls, and lined the cross hairs up on one of the cancer cells that appeared in her viewport. She smiled briefly, then squeezed the trigger.

A torpedo bullet sped from the firing pod beneath the sub, and plunged into the diseased cell with a fiery explosion. "Yes!" McNeil hissed, gritting her teeth in triumph. She moved the aiming mechanism to the next cell and blasted it into oblivion. She aimed and fired again and again, increasing in speed as she gained confidence.

Finally, she stopped and looked at the scene of destruction. The cancer spot was gone; blasted into dead cell material by her Cisplatinum bullets. Nothing remained except some cell

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wreckage—and the healthy cells behind and around the cancer spot.

Exulting triumphantly, she turned her submarine around and headed out into the bloodstream, looking for trouble.

"Quite something, isn't it?" a voice asked from far away, startling her.

She jerked back to reality and pulled off her helmet. She experienced several seconds of disorientation and then focused on her husband. Her heart was pounding in a strong, regular beat, and strength and adrenaline flowed through her body. She felt absolutely invincible. "Wow," she said. "I can see why that works."

Her husband grinned. "It's called visualization," he told her. "Obviously, I got the idea from that movie, *Fantastic Voyage*. But I started working on it because of something a cancer survivor told me. He said that when he was a kid, the nurses would give him a portable Space Invaders video game, so he could understand kind of what the chemotherapy drugs did to cancer cells. Said it helped him a lot, just to understand. And the doctors said that it makes a big difference, working with a patient that understands and has a more positive attitude as a result."

"But Bob, this is just pretending," Lois objected. "I was piloting a submarine, for crying out loud."

"Nobody can really explain it scientifically," he conceded. "But a lot of doctors now say that visualization enhances the ability of the chemotherapy drugs."

"So you can customize the program to every patient's needs?"

"To an extent. You used the one I've just finished. It's one of the more common ones, which is lung cancer. But eventually, we can have a different visual for every cancer. So the people using it really feel like they're in their own bodies, cleaning out the cancer."

"I do feel great," Lois admitted.

"Well, that's good. The boost in morale and attitude is every bit as important as the unproven benefits of enhancing the performance of the drugs through visualization."

"This is really neat," she said warmly. "You can help a lot of people with this." She shifted forward and hugged him. "Thanks for the demonstration, but I've got to go. Duty calls."

She gave him a long, lingering kiss before leaving.

McNeil strode into the precinct office and glanced around for Roberts. The officers who were in the room quickly turned to their desks, pretending they were working hard. McNeil ignored them and went upstairs. She caught a junior detective coming out of the men's locker room.

"Is Roberts in there?" she asked briskly.

The detective was caught off guard. "Yes, ma'am, Lieutenant. He's in there. He's been sitting in the shower for a half hour or more."

"Sitting?"

"Yes, ma'am. On the floor."

"Go tell him that I'd like to see him in my office as soon as he can get ready."

"Yes, ma'am, right away, Lieuten-

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ant." The detective hurried back into the locker room, and McNeil heard his agitated voice calling out to Roberts before she turned and walked to her office.

Roberts showed up at her door about ten minutes later, looking wet and haggard. McNeil surveyed him slowly and shook her head.

"They caught you with the gunman in the van, didn't they?"

Roberts nodded shortly.

"Those bastards," McNeil said. "They make it way too real. It doesn't help in any kind of training."

Roberts nodded again and sat down heavily. "Thanks for warning me," he said shortly.

McNeil was unperturbed. "I'm having a word with the programmer and the training officer. They seem to think it helps make you more prepared."

"Prepared for what? Next time I stop a van, I'm going to nuke it before I even get out of the car!"

"It'll pass," McNeil said calmly. "Take a minute to get yourself together, and then I want to take you to meet someone. A guy I knew in high school called me out of the blue, and wants to talk to me. He's the manager of a Virtual Motel, and it would't hurt for you to get to know him. Lots of things go on in his section of St. Paul."

Roberts nodded again, and took a deep breath. "OK, let's go."

They took McNeil's car, and drove to the beginning of West Seventh Street. The Motel was in a fringe neighborhood—not a bad section of town, but not one of the best either.

They walked in slowly, looking around a lobby that had seen better days. McNeil cast her eyes around, and lit on the man behind the counter.

"Hi, Lois," a short, dumpy and harassed-looking man said, hurrying out to meet them. Roberts was surprised that he addressed McNeil by her first name. It sounded strange for someone so tough, so experienced, and so smart.

"Hello, Stuart," McNeil said, shaking his hand. "It's been years."

"Yeah. When I heard you were a cop, I was expecting you in uniform."

"I'm a plainclothes lieutenant, Stuart." She glanced at Roberts, remembering him. "And this is Sergeant Alex Roberts. Alex, meet Stuart Tessier. Stuart, Alex has just been promoted to sergeant, and is new on the plainclothes beat. I thought I'd bring him along, show him your neighborhood."

Tessier, nervous and fluttery, shook hands with Roberts. When Tessier looked away, Roberts wiped his hand on his pants.

McNeil got down to business. "So how have you been, Stuart?"

"Oh, pretty well, pretty well," he said, his hands fluttering. "That is, until recently."

"What's the problem?"

Tessier looked troubled. "This will take awhile, and it's gotta be private, OK? Nothing for the police files yet."

Roberts felt uncomfortable, but McNeil didn't turn a hair. "OK, we'll start from there. Where would you like to do this?"

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"In one of the rooms," Tessier said, and led them away from the lobby, down a long hall filled with doors. He opened one on the end, and stood aside to let them enter.

It was a very small room, about twelve feet square, and ten feet high. There were two treadmills filling the center of the room, and two other pieces of apparatus that Roberts couldn't identify. Three people were crowded, but Tessier closed the door firmly.

"This is one of my Virtual Motel rooms," he said tersely. "Ever since I opened my Virtual Motel business has boomed, and this is one of the few times we've got an empty room. But I thought it was important that you go through the whole thing, because all this Virtual Reality stuff is pretty new, and you might not know a lot about it yet."

"Go through what whole thing?" Roberts asked, eyeing the unidentified apparatus.

Tessier made helpless gestures in the air. "Just . . . the whole thing. Everything. It's terrible. Just . . . terrible!"

Roberts looked blanlky at him, and McNeil took control again. "Tell us your story, Stuart," she said gently.

Tessier looked at her gratefully. "You know the concept of virtual reality, right?"

"Refresh us," McNeil said.

"OK. It's a computer visualization technology that got started in the 1980s. It was pretty crude back then. You'd put on some goggles that made you see in 3-D, kind of like in the novelty movies but better. And you'd put on a glove that was wired to a computer, like a computer mouse, but much more sophisticated. If a coffee cup appeared on your computer screen, you'd see the cup, but not the screen. And with your wired glove, you could reach out, pick up the coffee cup, and see what was written on the bottom of it."

"But it wasn't a real cup," Roberts prompted impatiently.

"Exactly! It was a computer image! Back then, you could tell, of course, that it was just computer graphics. But these days, you'd never know it wasn't the real thing. Graphics technology has advanced so far, you see."

"Yes," McNeil prompted.

"Well, those first virtual reality people did more. Like, an architectural firm would design a building on their computer? And then they'd arrange it so that you could walk through the building and look around, even though the building hadn't been built yet! You'd get on a treadmill," he patted the treadmill he was sitting on, "like this one, but not as sophisticated, of course. It was wired so the computer knew how you were walking, and would change the view you saw in your goggles accordingly. And your goggles were part of a helmet that was also wired, so the computer would know if you were looking to the right or the left, and also change that view accordingly. So people could get a feeling for the building before it was built."

"No offense, Stuart, but this is old stuff," McNeil said as Roberts shifted impatiently.

"I'm getting to it," Tessier assured

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her frantically. "So anyway, that's the basis for this technology. And somebody got the idea, if you can walk through a building, why couldn't you walk anywhere? So they developed walking tour software for places like Paris and stuff, but the program that really took off was something called Virtual Meadow."

McNeil nodded, but Roberts was puzzled. "I've only got experience with the police training programs," he said. "What's Virtual Meadow?"

Tessier smiled. "I've arranged for both of you to experience it." He held up a Smart Card. "This is the Virtual Meadow program." He popped it into one of the unidentified pieces of apparatus, and flicked a switch. "Now, if you two would each get on your treadmills and put on your helmets and gloves, we can run a demo."

Roberts was reluctant, but had to follow McNeil's lead. They got onto the treadmills, and put on their helmets. Roberts could only see a fuzzy grey nothingness.

"Now if each of you would make a gesture, pointing with your index finger?" Tessier requested. They both complied, and Tessier said, "Got it. OK. Ready?"

"Ready," McNeil said. Roberts nodded his helmet, and Tessier threw a switch.

And they were in a meadow. Roberts blinked in surprise, and looked around wildly. But he saw only meadow, stretching on and on for miles. He smelled a faint scent of wildflowers, and heard several birds chirping.

"Wow," he said.

"Why don't you go see what's over the hill in front of you?" Tessier said from far away.

He walked toward the hill, but found that a gentle stroll was more in order. He walked up the hill, which was not as hard to climb as he'd thought. He looked down, and a small stream bubbled gently on its way below him. Delightedly, he hurried down to it, and kneeled down.

His knee crunched slightly in the prairie grass.

He smelled the sweet, damp smell of the stream, and dipped his hand into it. The water was clean and cool, and he took his hand out and watched the drops fall from his fingers back into the stream.

He felt wonderful. He stood up and looked around, but he knew that he was alone. There wasn't a soul for miles around.

A deer and her fawn walked out of a small grove of trees and looked at him for a minute before disappearing back into the woods.

"Want to do some fishing?" Tessier asked from far away.

"Sure," Roberts said.

He looked at his feet, and a fishing pole and tackle box lay in the grass. He lifted up the tackle box—it was heavy, and kind of rusted. He opened it up, and a wonderful fishy smell rose up from among the rows and rows of lures. Suddenly, the vision began to dim.

And he was kneeling on the treadmill with nothing but a soft gray haze in his goggles. Heavy with disappointment, he took off the helmet.

"Man," he said. "That's great!"

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McNeil was taking her helmet off, too, with a dreamy look in her eye. "That was wonderful," she said. "I could have stayed there all day."

Tessier smiled in gratification. "It's our hottest program," he said. "It was invented by a psychiatrist who recognized the need for that kind of relaxation in an incredibly congested city like New York, and it's been real popular in any big city. You're stressed out from dealing with the city, and you come here on your lunch hour; spend an hour in a meadow, miles from everybody. You go back to work refreshed and ready to deal with the congestion again."

"That's great!" Roberts said again. He wanted to go back to it. "Are there any others?"

"Oh, sure," Tessier said. "There's Virtual Engineer, where you can pretend you're an engineer, and build a bridge or a building or something. I remember that one because I invested in it, and it hasn't made much money. But some others have made it big. There's Virtual Gameshow, where you're not watching 'The Price is Right'; you're a contestant. There's Virtual Family, where you can be any character in a family that you want. But it's not an ordinary family; it's a 1950s-sitcom-type, happy, cooperative family that only has problems that you can solve easily."

"Cool," said Roberts.

"Kind of creepy," said McNeil.

Tessier nodded. "I tend to agree with you, Lois. It's kind of strange. Especially since some people seem to be getting emotionally dependent on it. They're neglecting their own families because Virtual Family is so much more pleasant. It's turning into kind of a problem."

"I've heard more about the good programs," McNeil said smoothly. "Programs used by psychiatrists to help their patients with mental health problems, and programs used by patients to help with their physical health problems."

Tessier nodded. "I've also heard that the police are developing one."

"Yep," McNeil said. "They call it Virtual Beat, where you receive training in various aspects of your job. The first is training on shoot/don't shoot situations."

"I'm familiar with them," Roberts said sourly.

"We're getting off the subject," Tessier worried.

"You're right, Stuart. Continue."

"OK. Well, lots of Virtual programs have hit the market. Some are innocent, like Virtual Meadow, and some are kind of strange. There's Virtual Spouse, for example."

"Virtual Spouse?"

"Yeah. It was invented by a software salesman who traveled a lot and missed his wife. So he invented a program where he could go to a Virtual Motel in San Francisco, for example, and his wife would go to one here in St. Paul. They'd each install the Virtual Spouse disk, and connect to each other by satellite. Now, you noticed that when you were at the stream in the meadow, you felt the water on your hand? And smelled the wildflowers?"

"Yeah," Roberts said cautiously.

"It's because the helmet is con-

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nected to your brain somehow. I don't understand all of the technical aspects of it. But this salesman in San Francisco can make love to his wife here in St. Paul, by satellite."

"No way!" Roberts said.

"Amazing," McNeil grinned. "A Virtual Orgasm."

"Exactly!" Tessier said. "And the program simulates your partner by this apparatus that you lie on." He indicated the apparatus that Roberts hadn't been able to identify. Roberts leaped away from it in surprise, and eyed it suspiciously.

"It doesn't look anything like a human body," he said defensively.

"No, but it's all you need when you're hooked into the Virtual Spouse program," Tessier said. "This program has caused problems, too. Part of the software allows you to enhance your partner's physique or skills. Some people change their partner so much that they're not interested in real sex with their unenhanced partner any more."

"That's too weird," Roberts exclaimed, still eyeing the body apparatus. "By satellite? Do they have any privacy?"

"The beams are scrambled," Tessier shrugged. "That probably helps. I suppose you could buy a descrambler if you looked around for one."

"Are we getting to the point here?" McNeil asked.

"Almost," Tessier said. "See, Virtual Spouse also wasn't a big seller, because it's got a fairly specialized market. But the relatively admirable motives were quickly corrupted by less admirable people. Virtual Spouse was the forerunner of some pretty successful Virtual Porn programs. Programs that used the 'body' apparatus, but didn't need the satellite. You could choose any of several women, and choose the clothing they'd wear. They'd slink around in front of you, talk to you, and of course, perform any act you chose from a pull-down menu."

"A pull-down?" Roberts asked skeptically.

"Yeah. Old technology, but real easy for anyone to use."

"That's sick," McNeil observed.

"Yes, it is," Tessier said. "And people are getting emotionally hooked on it, too. That's what made me realize that something was wrong, and what made me call you."

"What was it?" McNeil asked.

"Well, this one guy started coming in here a lot. I started noticing him, because he worked his way up to two or three times a day. And, so, I got curious. And I thought, any program he's using must be pretty good. It's probably going to be a big seller." He stopped.

"And?" McNeil prodded.

"And . . . so . . . I tapped in on him."

"What do you mean, 'tapped in on him'?" Roberts asked.

"Well, these things are computer based. We've got a central server for the rooms. So I tapped into his room. I know it's probably illegal, and it's certainly unethical. But I was greedy, and wanted to know the name of the program so I could invest in the company," Tessier finished lamely.

"You're right that it's unethical," McNeil said. "As for illegal, the whole

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virtual reality thing is so new that I doubt any specific laws apply. But some privacy or Peeping Tom law would certainly apply to you, Stuart."

Tessier looked uncomfortable. "But let me tell you what happened next!"

"Go on," McNeil said.

"He was using a Virtual Porn disk," Tessier said miserably. "But he wasn't having sex with the image of a woman."

"What was he doing?" Roberts asked distastefully.

"He was beating her up."

There was a long pause as McNeil and Roberts looked at Tessier, and began to realize why he had called.

"I see," McNeil said.

"I first caught on to this guy a couple of months ago," Tessier said, his words tumbling over each other now. "It really disturbed me. So I started monitoring him."

"I see," McNeil said again. "So why did you call us today, instead of a couple of months ago?"

Tessier hesitated a long time. "I . . . I'd like you to put your helmets on again," he said. "I'd like to show you."

"Show us?" Roberts repeated.

"Stuart," McNeil said sternly. "If you've recorded what this guy did, that's serious invasion of privacy."

"Just . . . please. Put on your helmets."

McNeil and Roberts exchanged glances, then slowly donned their helmets with a feeling of rising dread. "Ready, Stuart," McNeil said. Tessier pushed a button, and McNeil watched

. . . as she reeled to the floor . . . hahahahahahaaaaa . . . and he was on her, before she could get up, ha-haha, she didn't have a chance, and the knife flashed in the air just before it plunged into her naked shoulder! She screamed and writhed in pain, haha, oh she screamed, as the knife entered. yes, and blood spurted brightly from the gaping wound, and. . . .

McNeil had her helmet off, and watched as Roberts ripped his off. They stared at Tessier with appalled eyes, both breathing heavily. Roberts felt like he was going to vomit. Tessier looked at them both with satisfaction combating the fear in his eyes.

"He kills her," Tessier said shakily. "Last night, for the first time, he murdered the woman."

"Jesus," Roberts said, still shook up. He sat down on the treadmill.

"That was appalling," McNeil said. She leaned against the wall. "And it felt like I was doing it! It was so real!"

"It's very real," Tessier assured her. "And this guy liked doing it. He did it again this morning, before you showed up. He's murdered two women."

"The images of two women," Roberts corrected him, trying to pull himself together. "It seemed real, but it wasn't."

"No," Tessier admitted. "It wasn't real. But I'll tell you what is real. This man is sick. He's dangerous."

"I'd have to agree with you," McNeil said, still shaking slightly.

"So I called you, Lois," Tessier said urgently. "This man likes to kill

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women!"

"What would you have us do, Stuart?" McNeil asked, knowing the answer.

"What do you think?!" Tessier shrilled. "Arrest him! Get him off the streets!"

She took a deep breath, and closed her eyes. "Stuart, this is going to be very hard for you. It's very hard for me to say. But I'm afraid we can't do anything. This man has broken no laws."

"Lois, listen to yourself!" Tessier cried. "You know he's dangerous! You know how real it seems! You just saw how thin the line is between pretend and real. It's just a matter of time before he kills someone for real!"

McNeil felt sick. "I know, Stuart. But we really can't do anything. We have no grounds. We only have an illegal electronic eavesdropping of a fantasy. Every judge in the country would throw it out of court, and put us, especially you, in jail."

Tessier blanched.

"This man is protected," McNeil went on. "The Fifth Amendment to the Constitution says that you can not be forced to incriminate yourself. So he can't be arrested on the basis of his own fantasies."

Roberts chimed in reluctantly. "If it comes to that, the First Amendment protects freedom of expression. If he likes to express himself by pretending to kill women, that's his right."

"Are you going to arrest me?" Tessier asked, his face gray.

"No, Stuart, we're not going to arrest you. But we can't touch this guy."

"But he's dangerous!"

"I know."

"He's a menace, he's sick!"

McNeil closed her eyes bleakly. "I know."

"But look!" Tessier sounded frantic. "Here's the card! Couldn't you play this for a judge? Get them to see what's going on?"

"No, we can't. It's not acceptable as evidence."

Tessier waved the card wildly. "But you've got proof!" he shouted.

"No," said McNeil. "We've got *virtual* proof. And that's not enough, Stuart."

Jean Searles surveyed the rack of dresses, and selected the style she wanted. A nice conservative dress, appropriate for work, but with the possibility of a deeper neckline if something should come up on the dating scene. It might look nice.

It did. Immediately, she was standing in front of a three-way mirror, examining how the dress looked on her. It felt great: silky, smooth, almost caressing her skin. Wonderfully light, feeling like it was of exquisite quality. She checked the label: it was a polyester blend.

She eyed herself critically in the mirror. It looked good—suspiciously good, as a matter of fact.

She accessed the pull-down menu, and chose the modelling option. Suddenly, she was looking at herself as the image of her walked and turned and posed in the dress. Jean was pleased; she looked great.

On a whim, she looked closer at herself. *Funny*, she thought, *I don't*

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remember my waist being that small. I mean, I try to work on my figure, but I don't think it's that slim.

Suddenly suspicious, she rotated her image until she had a front view. Her image, while fundamentally accurate, was subtly changed. Her breasts were larger. Her hair looked more silken, more beach-bunny blonde than its normal near-dishwater blonde.

"This machine is cheating!" she called out loud. Feeling outraged, she accessed the main menu and hit the Quit button.

She stood still for a moment, adjusting to the normal, non-seductive lighting of the Virtual Motel room. She grabbed the card as it ejected from the computer and looked at it cynically. "See the Spiegel catalog on disk," she read aloud, with heavy irony. "What a farce! That should be illegal; it's misleading advertising!"

She stepped out into the hall of the Virtual Motel, and ran into Amy, coming out of her room across the hall. "Wasn't that neat?" Amy asked excitedly. "I love going through the Spiegel catalog in Virtual Reality! It's so much more fun, being able to try everything on!"

"I don't know about that," Jean said.

"Oh, I love it!" Amy interrupted enthusiastically. "I bought a whole bunch of stuff! It's such fun!"

"Amy," Jean said firmly, "they're misleading you. They manipulate your image so that you look better to yourself than you will ever look in real life. They manipulate the senses so that it feels better than it ever will. The whole thing is a scam!"

"That couldn't be!" Amy retorted. "That would be illegal."

"How long has Virtual Reality been around as a consumer product like this?" Jean asked. "A year? Two years? There aren't any laws about it yet. Spiegel would probably say that they're doing nothing more than what they do with store mannequins. Or that it's not any different from the days they used those models with breast implants who were thirty pounds underweight."

They checked out of the Virtual Motel, and hurried down Robert Street toward their office building. "If you ask me," Jean muttered, "it's all a scam."

McNeil and Roberts grabbed a table in the diner and McNeil attacked her food. Roberts would have preferred hitting a delicatessen or something that served food with a lower grease content, but he didn't feel like he could complain. Besides, a lot of cops ate their lunch at this place, so it was more of a social thing. Roberts looked around for people they knew, but didn't recognize anybody offhand. McNeil hadn't greeted anybody yet, so Roberts shrugged and began wrestling with his lunch.

Neither of them talked much. It was more and more common that they would eat in silence, brooding. Roberts thought he knew why, but kept his mouth shut.

McNeil shoved a piece of meatloaf around her plate, and sighed heavily. Roberts eyed the congealed fat on it and nodded sympathetically, but

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McNeil didn't mention the food.

"Thinking about our visit with Stuart Tessier?" she asked abruptly, looking around to see if anybody was listening.

"Are you kidding?" Roberts answered. "I can't get it out of my mind."

McNeil nodded heavily for a minute, and glanced around again. "It's really bothering me," she confided. "I can't stomach the fact that there's this creep out there, who's so obviously dangerous, and we can't touch him!"

"Hey, it really bugs me too," Roberts assured her. "I try to tell myself that he hasn't done anything bad yet, but it doesn't make me feel much better."

"Me neither."

"Why does it bother us so much?" Roberts asked. "We see all kinds of violence and suffering. I thought I had some resistance built up."

McNeil looked at him sourly. "Through necessity, we manage to shut off our emotions when we see violence and its victims. But we would give anything to have been able to stop it. I think this incident has gotten to us because we're in the position of maybe being able to stop it. But we can't."

Roberts hesitated, then spoke. "You know, I've been taking a lot of training on the 'Shoot/Don't Shoot' programs."

"So what?"

"Well . . . when I'm in that program, I've shot a lot of people. But nobody's dead."

"That's different," McNeil said automatically. She stopped and took a bite of meatloaf, and chewed it thoughtfully. "That's different," she repeated slowly. "You're a police officer. There are times when shooting is justified. There aren't any times when murdering a woman for pleasure is justified."

"But he hasn't," Robert said, feeling like the bad side of a devil's advocate.

"He'd like to," McNeil shot back. "It's just that we never would have known it if it weren't for the virtual reality card."

"Or maybe," Roberts ventured, "he would have murdered someone by now if it weren't for the Virtual Reality card."

McNeil shot him a quizzical look. "Explain yourself."

"Maybe he's channeling his violence into a vehicle that doesn't hurt anybody."

McNeil stared at him. "You're defending this guy!"

"No," Roberts said as he flushed slightly. "I don't really believe what I'm saying. But I'm saying it because these are questions that are bothering me. I can't work them out, and I was hoping you could."

McNeil looked at him wryly. "Sorry, kid, this is new territory. Nobody has experience in it."

"So what should we do?"

McNeil leaned back and stared at the ceiling. "OK. Let's return to reality as we know it. Legally, we can't touch this guy, right?"

"Right."

"And we're not even clear on whether we should, right?"

"Right again."

"But it bothered us a lot."

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"You can say that again," Roberts said.

"He could be dangerous. We're not saying he is; we're just saying he could."

"Are we getting anywhere, here?" Roberts asked, then wished he hadn't.

McNeil flashed him a look. "Remember when that training disk had the gunman jump out of the back of the van and shoot you?"

"Quite vividly, thanks."

"You were shook up. You sat in the shower for half an hour, trying to pull yourself back together."

"So what?" Roberts asked, turning red.

"Remember the first time you shot somebody in your training?"

"Just as vividly, actually."

McNeil skewered him with her gaze. "The technicians said they had to turn off the system. Because you had to stop and vomit."

"I don't see that being upset at shooting somebody is a bad thing," Roberts said defensively.

"Of course it's not," McNeil retorted. "Here's my point. The police system is designed with lots of options, like evaluating your marksmanship. And while the realism is like nothing possible before virtual reality, it's not the most realistic model out there. Stuart Tessier's models are the most realistic on the market, because that's the demand on the consumer side. But you killed somebody on a low realism system and felt awful. This guy killed two women on a high realism system, and loved it." She sat back, triumphant at making an important point.

Roberts chewed reluctantly for a while. "You win," he said finally. "That's proof that this guy's dangerous."

McNeil looked around the room and leaned forward toward him. Roberts did too.

"I think we should keep this guy under surveillance," McNeil said softly. "Just to see if he decides that the Virtual stuff isn't good enough any more."

"How?" Roberts asked, feeling rising excitement and dread.

"I talked it over with my husband last night," she answered very softly. "He's a freelance electronics and software expert, you know."

"Yeah, I know." Roberts wasn't sure why, but it was always weird to hear McNeil talking about her husband.

"He said we could plant a bug on the server that Tessier has in his Virtual Motel. He could rig the software to pick the packets we want to monitor—key it to the target's account code or something like that. And we could monitor it from my office."

"No kidding! How would you explain the equipment?"

"No problem. We've all got monitors. I'd keep a pair of goggles locked in my desk. It wouldn't give us the full effect, but we'd be able to tell what's going on. I don't know about you, but I don't want to feel the full effect again."

Roberts agreed quickly.

"And we'd just keep tabs on him," McNeil finished. "Just . . . to see."

"It sounds good," Roberts said. "How would we—"

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A large group of cops entered the diner, noisily greeting them. McNeil gestured Roberts to silence, and put on a good-natured face, returning an old friend's insults.

Roberts showed up at McNeil's house in the evening, at McNeil's invitation. She met him at the door. "Come on in, Alex," she said.

Roberts entered with a strange feeling of unreality. He looked around at the beautifully decorated house, feeling slightly dizzy. "Nice place," he said wonderingly.

"Thanks." she said. "Why do you say it like that?"

"Like what?"

"Like you're surprised. You figure that nobody who hangs out with you could possibly have any taste?"

Roberts saw the familiar humor glinting in her eyes, but still wasn't sure what was the right thing to say. "No, no," he stammered. "It's just that . . . well, it just doesn't seem a lot like you."

A man chuckled from the living room. "He's got you figured out, Lois." McNeil's husband appeared in the doorway, grinning at her.

McNeil flashed him a smile. It was a bright, beautiful, shining smile, and Roberts had never seen anything remotely like it on her face before. He stared at her, trying to figure out if this really was the Lieutenant McNeil that he knew.

Bob McNeil walked into the room, smiling at Roberts and holding out his hand. "Hi, Alex, nice to see you again."

Roberts shook his hand numbly. He had only met Bob McNeil a few times, and it was always a surprise. Bob McNeil had always seemed like the most self-confident man that Roberts had ever met. It was strange, considering what a strong personality his wife had. It was probably just a cliche, but she made you think that her husband had to be a henpecked mouse, instead of the self-assured guy that Bob McNeil was. Roberts didn't know how to act around him.

"Hi, Bob," Roberts said inanely. "Nice to see you, too."

"Lois has been telling me about your problem," Bob went on. "We may have come up with a plan. But I can't say I'm very comfortable with it."

"Still?" McNeil exclaimed behind him. "I thought we'd been over this!"

"We have," he admitted. "But now I see Alex here, and I'm realizing that this isn't just a theoretical software problem. You're really planning on breaking into a private business in order to install an illegal monitoring device on their main computer drive. So that you can monitor the private fantasies of a person who has committed no crime."

"You make it sound so unsavory," Roberts commented wryly.

Bob McNeil didn't grin in return. "That's because it is! This country was set up so that the police couldn't go around doing stuff like this."

"Now come on, Bob, you know why we're doing this," McNeil objected.

"Yes, I know why, but it's not helping," he said. "There are some fundamental rights to privacy that are pro-

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tected under the Constitution. And you're planning on violating them. Don't you believe in them any more? What about the Fourth Amendment against unreasonable search and seizure?"

"That only applies to police," Roberts said. "If a private citizen gets some evidence and brings it to us, then it's OK; we can use it. Stuart Tessier showed us the recordings. We didn't ask him for them."

Bob waved an electronic device. "If it's OK, then why do you need this? You're going beyond what he's given you, and you're planting a bug without a warrant; without a judge ascertaining probable cause."

McNeil looked at Roberts. "You have to forgive my husband," she said coldly. "He's a civilian."

"I *wish* you would stop saying that word as if it's an expletive," Bob said in exasperation.

"I will, when you start displaying some common sense."

"You're being pretty free with your judgments today," Bob countered. "It makes me very uncomfortable when you go around trampling on someone's rights, based on an electronic image. Should I check with you the next time I play Nintendo? To make sure you approve of the game I play? Maybe we should hang around the rental stores and have everyone get our approval on the cartridge they check out."

"It's not even remotely the same thing," McNeil retorted. "They're completely distinct because the virtual reality program has a high realism mechanism. When you're in it, you can't tell that it's not real. You don't think you're playing a game—you honestly think you're doing whatever you're imagining. And that makes all the difference in the world!"

Bob looked serious. "So you're going to stop this guy from hurting someone. What about all the others? Are you going to try to get some kind of monitoring law passed, to catch other people who give themselves away like this?"

"A law like that would never hold up, and you know it," McNeil said.

"So this is a one-shot deal, operating above the law," Bob said. "You won't be able to interfere when someone else does this sort of thing, because you won't know that it's going on."

"I can live with that," McNeil said. "And if this guy opts for the real thing instead of an electronic image, his victim could live with it too."

"If it feels so real, why would he opt for the real thing?"

"Hopefully he won't. But maybe the virtual stuff is lacking is some subtle refinements that real life still has. That's what we're monitoring for."

Roberts watched them as they continued the argument, and marveled at the interaction between them. They argued so earnestly, but never lost their tempers.

McNeil broke off the dialog and turned to Roberts. "Did you bring the equipment?"

"Yeah, I did," Roberts said, eager to have something intelligent to add. He rummaged in his satchel, and pulled out a set of virtual reality goggles and

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a bunch of electronic hardware. "What did you want with this stuff?"

McNeil produced a smart card. "If I just describe what we saw, Mister Constitution here will say something like, 'the ends don't justify the means.' So I dropped in on our friend Stuart Tessier today, and he was very relieved to hear that we hadn't forgotten about him. He was happy to give me the smart card."

Roberts blanched. "That's *the* card?"

"Indeed," McNeil said smoothly. "Come and take a look at this, Bob. To use your vernacular, the justification of some acts is Self-Evident."

"That's the Declaration of Independence, not the Constitution," Bob McNeil said, eyeing the card uneasily.

"You're stalling, dearest," McNeil said. "If you feel the same after seeing this, I promise to drop the whole subject."

Bob shifted his gaze to Roberts. "That means it's pretty bad, isn't it?"

Roberts couldn't help smiling as he nodded. He liked Bob, and liked watching him and McNeil together.

A few minutes later, Roberts and McNeil sat in the living room as Bob vomited in the bathroom.

"It really shook him up," Roberts observed.

"It shook us up, too," McNeil pointed out.

"But we didn't york up."

"He watched the whole thing. That's more than we did."

Roberts nodded in silence. McNeil continued, "Most civilians don't get the chance to build up a tolerance like we do. This kind of thing doesn't often happen in the world of programming."

"True," Roberts conceded. "Don't you think you should see if he's all right?"

"He'll be fine," McNeil said serenely. "He's actually very tough. Did I ever tell you how I first met him?"

"No, you never did." Roberts felt strange again; as if McNeil's private life was completely off limits.

"He was trying to rescue an elderly couple from being mugged by four thugs. Very brave, but very dumb. They were beating the daylights out of him when I showed up."

"I didn't need your help," Bob gasped, tottering from the bathroom and looking very pale. "I could have handled them just fine."

"Yes, of course, dear," McNeil said, getting up to help him to a chair.

"And you used a gun," Bob continued, shaking off her helping hand. "That's not sporting."

McNeil flashed a look at Roberts. "'Sporting,'" she repeated to him, shaking her head. She turned back to Bob. "How is my poor little civilian feeling?" she asked with mock tenderness.

"Stop patronizing me and go get the schematics," Bob snapped.

Roberts watched them as they made plans for planting the bug in Tessier's server. McNeil must have picked up a lot of computer knowledge just being married to the guy, because most of the terminology was over Roberts's head. He just watched them poring over the plans, heads close together, discussing the problem with an unconscious intimacy

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that Roberts had never seen before. *Is this what all married relationships are like?* he wondered, but immediately knew that it wasn't. He had been called to too many domestic disturbances to have many illusions.

Someday, he thought, *I want something like that.*

"OK, so that's that," Bob announced, interrupting his train of thought. "Now, how are you going to get it installed?"

"We could let Tessier in on it and have him show us where it is," Roberts suggested.

"Absolutely not," McNeil said. "Nobody knows about this except the three of us. Tessier is not trustworthy enough on the subject."

"That means a break-in or a distraction," Roberts said.

"Probably a break-in," McNeil said.

"A break-in!" Bob groaned. "Listen, keep me out of that end, will you? If anybody finds out about this, I want to be free so that I can be available to make conjugal visits whenever possible."

"You just keep your mind on the technical end," McNeil instructed him.

"How do we break in?" Roberts asked. "And how do we get around the security system?"

"That shouldn't be a problem," McNeil said. "All security systems are required to be registered with the city. That registration will give us the information necessary to have a professional bypass it."

"Oh, no," Bob groaned. "When you say a professional, you don't mean that you're going to use—"

"Bob!" McNeil interrupted sternly. "The person's name does not need to be used in front of Alex, primarily for his own sake. And yes, that is the person I'm going to use, because the person is completely reliable in these matters, no matter what you think of this person."

Roberts kept his mouth shut, but listened intently.

"And you're only going to monitor this guy, right?" Bob asked. "That's all?"

"Yes, we promise," McNeil said. "Unless we're given reason to do anything else."

Bob sighed and shook his head. "I'm not reassured."

Jean Searles grabbed her lunch out of the refrigerator in the executive kitchen and hurried downstairs to the lunchroom. She was late and impatient: she had had to finish the president's letter to corporate before she could eat, and the dunderheads in Finance never got her the numbers in time.

She walked quickly into the lunchroom, looked around, and sighed. Too late. The women she usually ate with—when she got a chance to eat at a normal time—were already gone. Lots of the tables were full, but they weren't people she knew well. Looked like another lunch at her desk.

She bought a carton of milk to explain her presence in the room, and ruminated on the situation. It was the one thing she really disliked about being an executive secretary. She was isolated back in the executive wing,

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and didn't get a chance to talk with her friends like she had before her promotion a few years before. Ordinarily, she liked her job working for the president and one of the vice presidents. They obviously thought very highly of her, and gave her a lot of latitude. But they ate out with clients, or bankers. Lunchtime was lonely.

She headed back to her desk, feeling tired and a little depressed.

"Hey, Jean!" a voice called from behind her. "You're looking good today!"

She barely glanced around. "Thanks, Mark," she said briefly, and kept on walking.

"Yeah," Mark persisted. "You can wrap those legs around me any time you want."

Good God, Jean thought, and turned on one foot. The phrase came out of her mouth with the smoothness of thorough training. She looked him in the eye, and said, "Mark, that's inappropriate, and makes me uncomfortable."

Mark was caught off guard. "Is it? Oh. Sorry."

Jean turned again and walked away, feeling actively annoyed. It was bad enough when the rank and file made comments like that, but to hear them from a director like Mark was especially annoying. Departments generally took the character of the director running them, and Mark was one of the densest. How could a man go through a week of diversity training, and still be so stupid? She threw her milk down on her desk, sat and brooded.

At least she hadn't had to get in a long argument with him. That was one thing that diversity training had accomplished—the men recognized when they were being put on notice, and they knew that legal action was just around the corner if they persisted.

She shook her head and opened her lunch bag. Then she closed it again. Pulling out her notebook, she wrote down the encounter, dated it, and put the piece of paper in a file. Mark's first offense didn't warrant a complaint. A second offense did, backed up with a written record of the first.

The act of covering herself in a sexual harassment situation really got to her. *What does it take to find a decent man these days?* she asked herself irritably.

Social situations didn't seem any better. The guys she met always considered themselves some kind of Turbo Stud Muffin, and looked at her like she was little more than a penis receptacle.

I need to meet new people, she thought to herself. *I need to make more friends.* Sometime. When she managed to find the time.

She sighed again, and started her lunch.

Roberts was sitting at his desk, working on a performance review for one of the uniforms who reported to him, when McNeil called from her office.

"Roberts! You have a few minutes?"

"Sure," he replied, trying to sound casual. A couple of the other ser-

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geants cast him sympathetic looks. He didn't quite understand it. On the one hand, McNeil was certainly one of the toughest and hardest-driving cops on the force. On the other hand, she was one of the fairest people Roberts knew, and one of the best at her job. She was also very good at training new sergeants like him so that he had a better chance of solving crimes and not getting killed. He felt very comfortable working with her, but realized that he was in the minority. The other guys were scared to death of her.

They probably can't get past the fact that she's a woman, Roberts guessed, *and either resent her or patronize her.* He knew for a fact that those were two excellent ways to get her to bite your head off. Roberts, on the other hand, respected her even more than the chief, and that respect was completely independent of her gender. Maybe that was why they got along so well.

"Close the door," McNeil said as he entered her office. She was sitting with a bunch of electronic hardware arrayed around her, busily connecting it to something.

"What's all this?" he asked as he slouched comfortably in a chair.

"Our monitoring device," she said in low tones, glancing at the door. "The bug was planted last night. Now we'll see how well it works."

"It's planted!" Roberts repeated in surprise. "How?"

McNeil stopped and looked at him. "I'm certainly not going to tell you."

"Why not?"

"Because it's illegal, and telling you would be tantamount to admitting I had something to do with it. But now that I've told you, that makes you an accomplice, so make sure you keep your mouth shut."

"That's probably the most superfluous warning I've ever gotten," Roberts said, and McNeil grinned in agreement as she busily wired stuff. Then she stopped and looked at him again.

"One last thing on the subject," she said. "If you don't have the contacts to pull off this sort of thing, it's time you started developing them."

"Oh."

"And not just that kind of contact," McNeil continued. "I have friends in most of the social service agencies in town, in the D.A.'s office—hell, even in the Department of Transportation. You should too."

Roberts nodded and McNeil looked satisfied.

" 'Nuff said." She returned to her gadgetry, and then looked up triumphantly. "All set. Let's have a look." She dug out two sets of goggles. Roberts took one with a rising feeling of dread.

"Gee," he said sourly. "I'm really looking forward to what we're going to see."

McNeil returned his sour expression. "Let's just get it over with, OK?"

McNeil checked her computer. "Yep, he's got a new fantasy recorded. For this test, I'll just choose a random spot and we'll see what's there. No need to go over the whole thing now."

"Oh, absolutely," Roberts agreed quickly.

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McNeil rattled a few things off on her keyboard, then hit enter and put on her goggles. They both turned to the video monitor beside the computer and watched— *As the knife plunged down again, and she screamed, oh yes, she screamed, louder now, as he raised the knife high and—*

The image died as McNeil turned off the monitor and peeled off her goggles. Roberts looked absolutely gray.

"We've had enough for today," McNeil said in an artificially steady voice.

"Yeah," Roberts said tonelessly.

"We wanted to know if it worked, and it does," McNeil said, keeping her voice very calm.

"Yeah."

"If you have something else going, you can get on with it if you want," McNeil said with only a slight tremor in her voice.

"Yeah." Roberts pushed himself out of his chair and hurried out of the room.

McNeil sat at her desk for a moment, then went and got a glass of water. She pulled a report out of a drawer and started to work on it, taking sips of water. After a few minutes, she pulled a roll of peppermints out of her drawer and popped one into her mouth, as if trying to get rid of a bad taste.

The next week, Roberts puttered around at his desk as long as possible. He actively dreaded going into McNeil's office again. Finally, he sighed deeply and looked into space. "Might as well get it over with," he muttered aloud.

He poked his head in McNeil's office. "Anything today?" he asked hopefully. Maybe the killer had skipped a day. That would be great. He had grown to loathe the whole affair.

McNeil checked on her computer. "Yep," she announced grimly. "C'mon in. Let's check it out."

Roberts closed the door behind him, and came in reluctantly. He slumped down in his chair. "Listen," he said, rubbing his eyes. "I don't mind telling you, this is getting real old. It's polluting, is what it is. It's gotten so that if I even look at a woman, I feel guilty; like I'm some pervert."

"Cry me a river," McNeil said tersely. "You think I'm having fun watching some sicko get his kicks out of killing women?"

"Of course not," Roberts snapped. "I'm just suggesting that we trade off. Give us both a break."

"Absolutely not," McNeil said.

"Why not?" Roberts asked, barely able to keep civility in his voice.

"We have to monitor this crap to check for a pattern, and any deviation from the pattern. To do that, two watchers are better than one. Also, we're operating outside of the law on this. We got involved by accident, but we're both in it equally. We should keep it that way."

"Lots of really depressing reasons," Roberts summed up nastily. "All right, let's get this over with."

McNeil hit the start button without answering.

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The fantasy was basically the same as the one they saw in the Virtual Motel. The killer had established a pattern of choosing a woman from the pull-down menu, using her for a while, then choosing another one. A few days before, he had dropped the redhead, and was now using a blonde. McNeil and Roberts had gotten slightly desensitized by now, which was a relief and a worry at the same time. They got through each showing by concentrating on details: analyzing the patterns and checking for additions or deviations.

Halfway through, Roberts hit the pause button. McNeil peeled off her goggles and looked at him questioningly. Roberts looked puzzled.

"Has your monitor been serviced lately?" he asked.

"No. Why?"

"I think I'm seeing a flicker on the screen."

"You know," McNeil said, "I thought I saw that yesterday. But what's your point?"

"Check it out," Roberts said. "I think only the image of the woman is flickering. I don't think anything else is."

They turned it back on, and looked intently. There was a closeup shot of the woman as the killer punched her in the face, and Roberts stabbed his finger at the screen.

"There! See it?"

"Yeah," McNeil said grimly. Filled with disgust at the scene, she backed up the recording and ran it again in slow motion. They both saw it at the same time, and responded with a shrill inhaling of breath.

"Run it again," Roberts said faintly. "Frame by frame."

Video-based systems like the virtual reality programs had thirty frames per second. McNeil and Roberts stubbornly slogged through dozens of frames of essentially the same thing, and then the image shifted. It held its new image for seven frames, then shifted back right before the killer's fist thudded into the woman's right cheekbone.

They turned off the power and leaned back in their chairs as they took off their goggles. They looked at each other, feeling a fresh wave of sick fear flood over them.

"That's a new woman in those seven frames," McNeil said finally.

"And she's not from the pull-down menu," Roberts added.

McNeil sat at her desk for hours, studying the seven frames. There was no doubt that it was the face of a different woman, but that was about all she could deduce.

The new woman was blonde. McNeil wondered if that had any bearing on the killer's choice of the blonde woman from the pull-down menu a week ago, but couldn't take that conjecture very far.

She examined the image. Unlike the other women, this one was not scantily clad in leather and lace. This one was wearing a modern business suit, somewhat conservative in style.

"This one is real," McNeil muttered to her empty office. "This is someone he's seen on the street."

Roberts came in with a sheaf of papers, looking weary. "No reports of

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any homicide in St. Paul or surroundings in the last twenty-four hours," he said briefly. "One homicide in Minneapolis; victim is male. That's all."

"So this is still in the realm of electronic images," McNeil summarized.

"And we're still in the realm of helpless idiots," Roberts crabbed. "We don't even know who this woman is. There isn't enough detail."

"He's obviously pulling it from his memory," McNeil said. "Someone he's only seen once or twice, so he can't supply enough detail even for himself."

"What do you think he's doing?" Roberts asked. "How does he imagine a woman who isn't from the pull-down menu?"

"Must have brought in some kind of program-your-own-person package, like the one Stuart Tessier told us about when he described Virtual Spouse. So the killer tried to program the woman in here, but gave up because he didn't have enough to go on."

"So this guy must know something about software," Roberts observed.

"But he doesn't know anything about us."

"So what?"

McNeil leaned back. "As he finds out more about her, he's going to program it into his disk."

"Assuming he doesn't get tired of her and pick someone else," Roberts pointed out.

"True. But if he's building up to a real-life adventure, I think it's safe to assume that we'll know who she is before it happens."

"Not necessarily," argued Roberts. "You're assuming he'll practice her murder before he does it. But who's to say he won't attack her as soon as he knows where she lives?"

"Don't you think he'll spot some options for his attack, and fantasize about them before he creates his entire scenario?"

Roberts considered slowly. "Well, you're probably right. But I'm not sure enough to put any money on it."

"Me neither," McNeil admitted. She turned back to the computer. "I promised Bob I wouldn't access this file unless I had compelling reason to. I think we can establish compelling reason." She began typing.

"What's in the file?"

"The name of the person we've been monitoring all this time, and any other information that Tessier's computer driver has on him."

"Very handy," Roberts said, shifting closer to see the screen.

"Here it is," McNeil announced. She read aloud. " 'Lois, my darling, I couldn't supply you with this information and keep peace with my conscience.' Damn that man, anyway! 'If you want to find out about this guy, you'll have to convince me that you need to, and I'll give you the password you'll require to access the information. Love, Bob.' "

"Civilians are such a pain," Roberts observed wryly.

McNeil checked her watch with an angry gesture. "I'll have it tomorrow. Count on it. I've just about had it with his moralizing."

Roberts looked away so she wouldn't see him smiling.

* * *

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Bob McNeil came home and found his wife sitting in an armchair in the hallway, waiting for him.

"You're late," she informed him sternly.

He looked at her in surprise, noticing the police radio beside her and her gun within easy reach. He shook his head. "I prefer something along the lines of 'Hello, dear, how was your day?' " he said. "A kiss is nice too, sometimes."

She didn't smile. "You and your overactive conscience! Requiring a *password* before I can find out about the sick individual we've been monitoring?"

"Oh, you mean the sick individual who is a free, adult citizen of the United States? Who has committed no crime? Who has certain unalienable rights which we're stomping on?"

"You're making me nauseous," McNeil informed him. "What about the women he's killing? The inalienable rights are life, liberty, and the pursuit of happiness. Which one of those does murder impinge on?"

Bob looked irritated. "Rights only apply to humans, not electronic images!"

McNeil looked at him in silence for a moment. Then she stirred. "I have a new development to report."

He paused in hanging up his coat. "Uh-oh."

"Indeed. A new woman has appeared in his fantasies. A real woman."

Bob looked very concerned. "And you're sure she's real?"

"She's wearing normal clothes, not those skimpy things the others wore. She isn't a crisp, distinct image—she's blurry, lacking detail. There is nothing like her in the pull-down menu of that program. All of that leads me to believe that she is someone he has seen and obsessed on."

He sat down on the stairs with a heavy sigh. "That's pretty convincing. What's your plan?"

"We doubt that he'll attack a real woman without developing a scenario and acting it out in his fantasies first. If he does that, we'll have ample warning of who is in danger and when. But if he attacks at the first opportunity, we won't be able to save her because we've had no advance warning."

"And you think he'll do that?"

McNeil shook her head. "I honestly don't know. I suspect he'd work out a scenario first, but we can't count on it."

"So what do you want to do?"

"I want to get the information on who this guy is. I want to run a make on him and see if he has any prior convictions on this sort of thing. I want to check him out, and hopefully spot the woman while I'm watching him. I want to make sure he doesn't hurt anyone."

Bob closed his eyes. "OK, OK. You win. I'll let you in to the file."

"Thank you, dear. What's the password?"

He hesitated. "I honestly didn't think this thing would get this far. I figured it would fizzle out somehow."

"It didn't. What's the password?"

"So I didn't think you'd ever need the password," he continued awkwardly.

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She looked at him icily. "What is it?"

"And I picked something I figured you wouldn't try on your own."

"Bob. Tell. Me. The. Password."

He looked away from her. "Access the file where you read my note to you. Then type 'Bruce' and hit return."

"The password is *Bruce*?"

He nodded uncomfortably.

She checked to make sure her gun was within easy reach before she spoke. "Sometimes," she said with heavy emphasis, "your sense of propriety is way out of line." She picked up her gun, and walked away.

He nodded quietly. "Sometimes I'm inclined to agree with you," he said softly.

Jean looked at the man in the driver's seat of the car, and suddenly felt very helpless. She did not know this man at all, and had ended up here against all of her best judgment.

She had been feeling lonely again at work, and so had been delighted when some of the girls invited her to go with them for a drink after work. To her surprise, they had picked a bar on the 494 strip, way off in a suburb of Minneapolis.

"They say that sometimes members of the Twins or Vikings come here," Amy gossiped excitedly. "Wouldn't it be neat to see one of them? Maybe even meet one?"

Jean agreed halfheartedly. Privately, she figured that the number of professional athletes her age that were still single had to be pretty small. And if they were anything like the jocks in high school, they'd probable want a brainless bimbo.

Still, it was fun to be out with the girls. She appreciated being invited. It made her feel less isolated there in the executive corridor.

"Hello, ladies," a voice boomed nearby. The five women looked up to see a contingent of four men sauntering up to them.

Jean listened patiently as the obligatory patter took place before the guys joined them. She watched the guys as they talked, and made quick judgments. Jerk. Jerk. Jerk. She stopped at the last guy, who seemed kind of shy. She gave him a smile. In her experience, the shy ones were often the most interesting, and least likely to act like a caricature of Neanderthal hunters.

She still wasn't quite sure how it happened. Barbara and Amy, who she had ridden with, announced that they had car trouble, and suddenly they were riding home with one of the guys. Not the shy one—one of the louder ones. Jean found herself in the front seat, sitting in silence while the childish banter flowed over her. Suddenly she realized that Amy was giving him directions to her house.

"Have fun, kids," Amy called gaily as she got out.

Barbara only lived a couple of blocks away, and Jean felt more and more uncomfortable as they approached. She considered getting out with her, but her apartment building was miles away and Barbara had no other car. With considerable misgivings, she bade Barbara goodbye, and started giving the guy directions to

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her neighborhood.

She didn't really want him to know where she lived, so she directed him to the general area. "Well, thanks," she said as he pulled into a church parking lot. "It was nice meeting you."

Suddenly, he was close beside her, with his arm around her. Whether he meant to or not, the arm kept Jean from getting out the door. "Hold on, baby," he said quickly. "What's your hurry?"

In restrospect, picking a deserted church parking lot had been a big mistake. She looked around and saw nobody. She looked at him, and realized how much stronger he was. "I really have to go," she said as steadily as she could.

He tried to kiss her, and she turned her face away. In response, he started kissing her neck.

"Please don't," she said.

"Come on, loosen up," he said, putting both arms around her and pulling her to him.

"Let me go!" she said in a sudden surge of fear, starting to struggle.

"Get in the mood," he urged, holding her easily.

Her mind stepped back from the situation, and she tried a new tactic. Getting control of her fear, she turned toward him. Digging her fingers into each side of his windpipe, she pushed his head back so she could look him in the eye. He moved back with a gasp of pain and surprise.

"I told you to stop," she said as steadily as possible, looking him straight in the eye. "So from now on, anything you do is classified as assault. If you don't let me out of this car right this minute, you'll be in jail for five years."

She stared straight at him as his expression went from surprise to anger. She hoped her mounting fear didn't show in her eyes as she realized that she had just used every weapon she had.

He hesitated for a moment, and then jerked his hands away. "OK, fine!" he snapped. "Get the hell out of my car."

She needed no urging. She scrambled out as quickly as she could.

"Bitch!" he yelled at her just before she slammed the door.

Creep, jerk, asshole, pig, she screamed in her head, but didn't dare say them out loud. She scrambled off the asphalt and stumbled on the grass as she hurried away. He gunned his car and tore out of the parking lot, leaving a trail of melted rubber in his wake.

She was shaking badly as she headed for home, trying to keep to the shadows in case he changed his mind and came back to press matters further. A car roared toward her, and she stiffened in fright before it rumbled past. She noticed some shadows up ahead, and tried to figure out how to avoid them. But they were just from a hedge moving in the wind. Every corner, every wall, every car held a potential attacker, and she walked as quickly as she could. Never, never, never, she cried to herself, would she ever allow herself in a car with a strange man. Never again would she go to one of those meat market bars. Never again would she even look at

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another man as long as she lived.

The neighborhood that had seemed so safe felt like it was full of deranged maniacs. The world of men seemed the same. What did it take to meet someone nice? What did she have to do? What was she doing wrong?

She finally got to her building, and fumbled with the keys. She didn't relax until she was in her apartment with the door locked and the shades pulled. She called Amy and told her what had happened. Then she sat down on the couch, and started to cry.

McNeil showed up at her office earlier than usual, but found Roberts sitting inside waiting for her.

"Homicide, downtown St. Paul, last night," Roberts said tersely. "Female caucasian. I'm waiting for details."

McNeil cursed and turned on her computer.

"Did you get the password?" Roberts asked.

"Yeah," McNeil said briefly. "Anything else on the homicide?"

"One thing. It's a gunshot. Doesn't really sound like our buddy. He prefers knives."

"True." McNeil accessed the screen and typed in the password quickly.

"*Bruce*?" Roberts said incredulously, reading over her shoulder. "What kind of a password is 'Bruce'?"

"Shut up," McNeil said shortly. "Here's the information. Write it down."

"'Stanley Boegemann,'" Roberts read off the screen as he wrote down the name and address. "Well, Stan, my man, you're one sick puppy."

McNeil wasn't listening. After Roberts finished writing, she began pounding the keyboard again. "What's up?" Roberts asked.

"I'm checking to see if there's a new one." She paused and read the screen. "Damn! There is."

"Ahhh, shit!" Roberts swore.

"Let's get it over with," McNeil said.

She got off the bus and walked into her apartment building as evening fell. The perfect time, yes, the perfect mood was set. Where she was, and she didn't know he was there, no, she was totally off guard! I've got you now, I've got you now!

He followed her into the building, and went up the stairs toward her apartment—

McNeil hit the pause button, and they peeled off their goggles and looked at each other.

"He's gonna do it," Roberts croaked with a dry throat. "He's gonna make it real."

"And he's tracked her to her house somehow," McNeil said.

"Yeah. I wonder how."

"Beats me," McNeil said. "But based on the few visuals he put into the program, I recognized the neighborhood. It's the Mac-Groveland area. Some of those shops he remembered are one-of-a-kind. They're on Grand Avenue, around Macalester College. So she must live in an apartment building near there."

"There were quite a few visuals of the building too," Roberts said. "I think I'd recognize it if I saw it in

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person."

"OK," McNeil said, obviously deciding something. She fished out a quarter from her pocket. "Call it in the air." She flipped it expertly and caught it in her hand.

"Heads," Roberts said automatically.

McNeil slapped the coin onto the back of her hand. "Heads," she proclaimed. "So you get to tail her tomorrow."

"Tail her? How?"

"Find the bus schedules for that area. Show up before pickup time, and see if you can find her building. If you can't, take the bus from the beginning to the end. See if you can locate her. Tail her downtown, tail her back, find out as much as you can about her. Get Boegemann's driver's license picture from the DOT. See if you can spot him, see if you can find out how he's tracking her, as much as you can about him."

"OK," Roberts said grimly. "Got it."

"Do a good job," McNeil instructed. "This is getting dangerous."

Part Two: INTENT

It was only seven in the morning, and it already seemed like nothing was going to go right. Jean was tired—first the terrible experience last night, then lying in bed simmering in frustration and anger and fear. Sometimes it seemed to her that there weren't any eligible men left on the face of the Earth. Sure, there were some decent men, but they were all married by now, and the only ones left were the ones nobody would ever want.

As a result she overslept, and didn't have time for breakfast. And then she was in such a hurry that she didn't have time to hunt down her tennis shoes, and now she was stuck at the bus stop in her high heels. She shifted uncomfortably, and cursed at the bus as it finally appeared around the corner. She was tired of the bus ride; tired of jockeying around for a decent seat; tired of trying to find a nice guy in a sea of jerks. And she wasn't looking forward to telling Barbara what had happened to her. She didn't want to talk about it. She didn't want to remember it.

She jostled into line, and fought her way into a seat. The only ones left were those weird sideways-facing seats which she hated, because you leaned every which way as the bus started, stopped, and turned.

She sighed—she was doing a lot of sighing these days—and leaned back, wishing the ride was over.

Roberts was pleased with himself. He had discovered the bus routes and times, and had shown up in plenty of time. He hated being late, and being a cop had done a great deal to strengthen that feeling. He had no idea how long it would take to get to the intersection of Snelling and Grand, so he got up extra early, and arrived half an hour before he needed to. It only took ten minutes to cruise up and down Grand Avenue around Macalester College before he was convinced that he had found the right building. So he had a twenty-minute wait. That was irritating, but boredom was always better than being

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stressed out, so he checked around for something to do. He parked his car in the lot of a little shop in the area, and soon found some nice shops that sold him breakfast. He was munching cheerfully as he waited for the woman to show up at the bus stop.

After a while, people began coming. Nobody fitting the woman's description was at the stop, and Roberts began to worry he had picked the wrong one. Just as he was about to decide that the whole morning was a waste, a blonde woman finally hurried into view. He couldn't get a good look at her face, but the build and age seemed right. Roberts got out of his car and walked to the bus stop at a leisurely pace as the bus rumbled up the street toward them. He ended up in line a few people behind her, and tried to study her discreetly.

It could be her, Roberts decided, but he wasn't prepared to swear to it. Standard business wear, normal dress-type shoes. Most of the women were wearing tennis shoes, and carrying their dress shoes in a bag for after the commute. But this woman wasn't using tennis shoes, apparently preferring her dress shoes. This indicated that she was a professional woman; one who maintained a businesslike appearance at all times. Obviously a no-nonsense type, probably a manager or something.

Roberts eyed her discreetly as the line shuffled forward, feeling in control. You could certainly tell a lot about a person by the way they dressed.

He caught a glimpse of her profile as she turned to climb the bus stairs, and a shock of recognition went through him. That was her! That was definitely her! We have visual contact! The woman he had seen repeatedly on the virtual disk was here in real life, climbing onto a bus. There could be no mistake. The image of her face, with the fist thudding into her right cheekbone, was burned into his mind.

He clambered into the bus, fumbled his change into the meter, and took a seat across the aisle from her in one of those weird sideways-facing seats that he liked because of the legroom they provided. He buried his face behind a newspaper, and sat back.

The bus lumbered along Grand Avenue, and he stole a look at her. She was sitting casually, but with considerable composure, confirming his suspicion that she was a high-powered businesswoman of some kind.

He scanned the passengers behind him to see if he could spot anyone watching her. Then he shot a look at her, and checked out the other people in the sideways seats. He snuck another look at her, and then looked ahead, toward the driver. He glanced at her again, and froze. She was looking right him!

He gave a little squawk of surprise, and quickly hid behind the newspaper. But he couldn't stay there. He felt her eyes boring into him, and finally had to look at her again.

She was gazing at him, with a slight smile on her face. He looked back helplessly. *Don't blush, please don't blush,* he begged himself as he felt

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his face turning bright red. He buried himself in the newspaper again. *How did she make me? How did she know I was tailing her?*

He snuck another look, but now she was looking away. He felt his face cooling; he took a good look at her so he could recognize her immediately if he needed to.

She was actually very attractive. Nicely dressed in a conservative dove-grey suit that went nicely with her soft blonde hair, pretty features, and an air of composure and assurance that Roberts found himself drawn to. And beautiful, deep green eyes that were—oh my God, she's looking at me again!

He blushed to the roots of his hair, and tried to look away, but didn't. She smiled warmly; maybe sympathetically at his discomfort. He found himself smiling back, and felt like he should say something, but the bus had shifted north to Summit Avenue, and suddenly plunged down the long hill into downtown. He almost fell out of his seat, and kept his balance with difficulty. When he looked back at her, she was looking out her window with a strange expression on her face.

There was a moment of awkwardness when she got up at her stop. Roberts didn't want to seem like he was following her, but fortunately several other commuters had the same stop. Roberts joined the crowd and followed her at a distance.

He almost lost her in the chaos of downtown during rush hour, but managed to get her back in sight as she strode along Robert Street. He tailed her until she reached her office building. She was safe in there, and there had been no sign of Boegemann. He left the area, and went to work.

Jean was bored to death with the bus ride. As a matter of fact, she was pretty discontented with many aspects of her life at the moment, but knew some—not all—were temporary crabbiness. She looked out of the window. She knew every landmark on the bus ride. She recognized every storefront, every billboard. She even knew everybody on the bus. The commuting crowd often formed into a miniature community, and by now she knew, if given a choice, who to sit next to and who to avoid.

She glanced down the aisle, and spotted the middle-aged woman who snapped and cracked her gum so loudly and regularly that she had almost driven Jean crazy on a ride home one night. Looking behind her, Jean saw the man who always listened to some sort of classical music through those miniature headphones that did nothing to keep the sound to the listener. She glanced around the rest of the bus, and exchanged smiles with some of the people she knew. She looked toward the back of the bus, and saw someone she didn't know. Obviously a student of some kind, sloppily dressed with a backpack; nothing interesting there.

A guy across the aisle rattled his newspaper loudly as he pored through the sports section. Jean glanced at him, and quickly categorized him with the gum snapper as a

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potential annoyance. A good person to avoid when you're crabby. She hadn't seen him on the bus before either, so she looked at him for a moment. She was about to turn away when he looked up from his newspaper, and looked directly at her.

It surprised her, but surprised him even more. He looked flustered, and made a sound like he was clearing his throat. He turned quickly to his newspaper again.

Well, that was odd. She certainly hoped she wasn't going to have trouble with him. She had had enough of weird guys to last her a lifetime. Some of her warning bells sounded, making her more alert. She decided to keep an eye on the guy.

Sure enough, a few moments later he was looking at her again. Sometimes all it took was to look right back at the creeps, and that would make them decide to back off. She locked eyes with him, and it was like somebody had thrown a switch in the guy: all of a sudden, he turned bright red.

She felt herself soften almost immediately. He looked so crestfallen; so embarrassed that he was blushing, she decided she had misjudged him. He looked like just a normal guy, maybe nicer than most. Nicely dressed, with a good build, kind of handsome in an ordinary, non-Hollywood sort of way.

She broke the gaze, and looked outside again. The bus was turning north now, heading for Summit and the hill. No matter how many times she saw it, she still enjoyed the view from the hill near the University Club. She saw it coming up, but it was still a block away. She turned and looked back at the guy.

She caught him staring at her, and he immediately turned bright red again. She found herself smiling at him, he looked so sweet when he was embarrassed. He smiled back in a sickly sort of way, and even looked like he was going to say something when the bus dodged around the stop sign at the top of the hill and plunged down. It always made her stomach flutter, a faint reminder of a roller coaster, but she was used to it by now. But that guy was taken totally by surprise, and was almost thrown from his seat. He scrabbled wildly to regain his balance, with a look of wild chagrin on his face. She quickly looked out of the window, trying hard not to laugh at him.

Somehow, the cute stranger on the bus made her feel better. He seemed real; he seemed sweet. He also seemed a little comical, but in a nice way, like a guy who was not pretending to be Cary Grant, but just acting normally. A big difference from the oily jerk of last night.

She was actually in a good mood as she got off the bus and headed for work. As she approached her desk, Barbara was waiting anxiously.

"I just heard about what happened after Amy and I got out of the car," Barbara said with distress. "I am just sooo sorry!"

Jean was on balance now. "Yes, it was pretty scary," she said calmly. "But I got out of it all right."

Barbara left after more profuse apologies and an invitation to lunch. Jean was relieved that she had been

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able to handle it so easily. It had helped that she felt better by the time she got to the office.

She hoped he would ride the bus again.

Roberts got to the office late and irritated, a result of blushing every time he relived the bus ride, and also because he had left his car in the MacGroveland neighborhood and took the bus downtown. He slipped into his desk as inconspicuously as possible, and started on some paperwork. He didn't get far before McNeil summoned him into her office.

"Anything?" she asked briefly.

"Yeah, lots to report," he said. "She showed up at the bus stop, and I got a good look at her on the bus. Visual I.D. No doubt about it, it's her."

"Do you have to go to the bathroom?"

"What?"

"You're bright red. Is something wrong?"

"No, no, nothing," Roberts said, rattled, figuring he would gladly pay a large sum of money to be able to stop blushing. "I hurried in this morning. I didn't want to be late. I must be getting out of shape." Pride made any mention of his embarrassment completely out of the question.

"Oh." McNeil dismissed the subject. "Any sign of Boegemann?"

"Nope. Nothing."

"Well, I suppose he wouldn't be tracking her every day. See if you can't figure out what bus she takes home. Maybe go with her. Check out the situation."

"Right," Roberts said mechanically. "No problem." Except for my neon face, he added silently.

Dave Porter offered Jean a ride home. He was one of those nice guys who was married, and he lived in her general neighborhood. He was in Customer Service, and usually worked late, but when their schedules meshed he offered her a ride. His car was so much more comfortable than the bus that she automatically accepted his offer, and didn't think about the cute guy on the bus until after Dave had walked away.

Well, I'll probably never see him again anyway, she decided. She still smiled at the memory, but a hectic workday had jaded her somewhat. *He's a strange man staring at me on the bus,* she reminded herself. *Encouraging that kind of thing will bring nothing but trouble.*

She rode home with Dave. Listening to a vivid description of his sick baby daughter's bowel movements was a small price to pay for getting home twenty minutes faster.

Stymied that night, Roberts was ready in the morning. He had scouted out the area and had found some shops on Grand Avenue that he liked. He stopped at a bakery and picked up some fresh-baked bagels. He crossed the street and bought some cream cheese, so fresh that the milk still wept from the curds. And then half a block down, he picked up some fresh smoked salmon at a combination delicatessen and coffee shop, and took a table there until it was time to position himself by her apartment

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building.

Roberts found himself enjoying the morning. She lived in a nice section of town, a few blocks east of Macalester College on Grand Avenue. The shops he enjoyed were close by, and Summit Avenue, with its stately mansions and divided parkway, was only one block to the north. It was very pleasant to start his morning in that neighborhood. The bus ride itself wasn't much fun, but her office was in a bustling and well-kept area of downtown St. Paul on Robert Street, near the Ordway Music Theater. It beat the hell out of the police precinct.

Five minutes before the bus was supposed to arrive, he strolled to the bus stop. He was primed and psyched today—no more being rattled. He sipped calmly from a cup of coffee, and spotted her already in line. *OK, lady, do your worst,* he thought at her.

He saw her moving around, and sensed that she was going to look in his direction. He made sure he was looking down the street in the opposite direction. Smooth. He was on.

He turned back toward the line, and was gratified to see that she was looking away from him. He had this figured out. He was set.

He glanced at her when she wasn't looking. She was wearing another nice suit, but had tennis shoes on today. *So much for my being the next Sherlock Holmes,* he thought disgustedly.

In the five minutes before the bus came, she turned to look toward him three times. He always anticipated it, since her body movements warned him, and managed to be looking away twice. The third time, he was gazing forward, apparently not seeing her.

I've got to be good today, he warned himself. *I obviously made her suspicious yesterday, if she's checking on me. Be innocent. Be ordinary. Blend in.*

The bus finally blundered into sight, and the line jostled together. Roberts saw that there were more seats available this morning, and quickly formulated a plan. While his target was sitting down, she couldn't look at him. He mapped her seat, in those same side-facing benches, and located the seat farthest away from it.

He walked past her, feeling her eyes peering keenly at him. He looked down, carefully avoiding peoples' feet, and grabbed a seat near the back of the bus, next to a heavyset guy with earphones. The music blared tinnily from them: "Bum-bum-bum, *BUMMMM!*" Beethoven's Fifth Symphony. Nice touch.

Feeling proud of having accomplished so much, he blew it by glancing at her right after getting settled. He looked across the length of the bus, straight into her waiting eyes. Damn! It startled him, and irritated him too. She caught him again! He looked away as quickly as possible.

Jean couldn't help smiling in triumph as the cute guy quickly looked away from her, unable to hide a look of chagrin. *He's here, he's here,* she exulted. *And I caught him! No matter how he tries to hide it, he's interested in me, no doubt about it!*

The fact that he was a stranger no longer bothered her. For reasons she

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couldn't explain, she felt safe about this man. And his shyness, which would normally have been a barrier, didn't bother her. It was part of the reason he seemed safe. And she had recognized the coffee cup he had been holding this morning: it was from that nice deli on Grand Avenue that she went to occasionally. Well, she decided she would see if he went there every morning. Do a little scouting, a little "covert surveillance," like in those spy movies.

See what developed.

One beautiful, sunny morning, the kind that seems so rare in Minnesota, Roberts was even whistling as he strolled around collecting his breakfast. The shopkeepers knew him by sight, now, and the owner of the deli had already expertly sliced off a succulent piece of smoked salmon by the time he reached the counter. He chatted and joked with them, and then found an empty table and laid out his culinary treasures.

This is why I live in the city, he gloated to himself as he spread the cheese on the warm bagel, and covered it with the salmon. He took a sip of coffee, and spread out his newspaper, relaxing in his routine. He checked his watch in a leisurely way. Ten more minutes before he even had to think about leaving. Plenty of time. He added another piece of salmon to his bagel, and savored it. Fabulous stuff, the kind that fills your mouth with flavor.

He became absorbed in his newspaper for awhile, then checked his watch again. Five more minutes. No problem.

"Excuse me," a voice said near him, "is this seat taken?"

He looked up mildly, into Jean Searles's deep green eyes. His eyes bulged out of his head, and he stammered out the first thing that came to his mind.

"You're early!" he blurted, and tried not to spit bagel pieces.

"I'm what?"

"I-I-I mean, I mean no. Um, have a seat." Holy shit, what was he going to do? He watched her sit down, and tried to gather his scattered wits together.

"Don't you take the same bus as I do?" he asked casually.

She flashed him a look of tolerant amusement that warmed into a friendly smile. "I'm Jean Searles." She held out her hand, and he shook it numbly.

"Alex Roberts," he said automatically. "Pleased to meet you." Sitting there, this close to her, he realized how beautiful she was. Realizing he was staring, he looked down at the table. "Would you like some of my bagel?"

"No, thank you," she smiled. She cleared her throat in a nervous sort of way and leaned forward slightly. "I hope you don't mind my inviting myself to sit with you."

"No, not at all," he said automatically. What else could he say?

"I don't usually do this kind of thing," she said, and cleared her throat nervously again.

"What kind of thing?" It seemed like a safe question while his mind scrambled to its feet again.

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"Introduce myself to strange men. I mean, men I'm not formally introduced to."

Roberts noticed with amazement that she was very nervous. What was she doing? What was going on?

"Well, you can relax," he said, casting for a conversational gambit. "We just introduced each other. If you like, I'll stand and bow, to make it more formal."

She laughed. She had a nice laugh; a nice smile. He could tell she was relaxing a little. "I've seen you on the bus," she said. "I saw you looking at me."

He found himself blushing again, and cursed inside. "I'm sorry; I hope I didn't make you uncomfortable."

She smiled warmly at him again. "Normally, it would have. But I could tell you weren't a creep."

"I'm glad. How?"

"I just don't think some pervert would blush the way you did when I looked back at you. I could tell that you were a nice guy."

He blushed even more. "Well, if blushing is your criterion for purity, then I'm a saint." He looked at her, enjoying her smile. His mind was scrambling back to its feet, and he plunged on. The next step seemed perfectly normal.

"Listen," he said, with only a little more awkwardness than he felt. "I know we've just met, and you have to be careful in the Naked City. But if you'd like, I'd love to meet you here for breakfast tomorrow morning. This neighborhood has some of the best food you've ever tasted. And maybe we'd be able to talk for a while. Maybe get to know each other a little bit."

He knew from her expression that she was going to accept. *This is great,* he exulted. *It'll be easier to keep tabs on her if we know each other.*

In the back of his mind, little warning bells were ringing, but he chose to ignore them. After all, he was doing this purely as part of his professional duty. There was nothing personal on his part.

He'd just better not tell McNeil about it. She wouldn't understand.

They set a time to meet in the morning, and then strolled toward the bus stop together, chatting lightly. They endured the ride together, and then he walked her to her building. He enjoyed her company so much that he forgot to keep an eye out for Boegemann until they were almost at her building, but he didn't seem to be around.

"Well, I'll see you tomorrow morning for breakfast," she said, pulling him out of his scanning mode. He pulled his attention back to her smiling face, and found himself smiling back.

"I'm looking forward to it," he told her. She walked toward the elevator, and he turned to go. She kept looking at him, smiling, and he realized that he was still looking at her. He bumped into a group of businessmen in a hurry, and by the time they got straightened out, she had disappeared into an elevator.

Not exactly a smooth departure, he thought to himself, ignoring the annoyed comments the businessmen rained on him. *But it doesn't matter.*

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I'm only doing this as a police officer. I'm trying to protect her.

He was deep in thought as he made his way to the precinct office. He decided that he had accomplished a lot. He could keep her under surveillance without worrying about being spotted. And he had established a firm visual I.D. so he could spot her quickly and describe her easily.

McNeil greeted him when he came in. "Anything new?" she asked briefly.

"Yeah, as a matter of fact," he told her. "I've got a name. She's Jean Searles."

McNeil wrote it down swiftly. "Good work," she said. "How did you find out?"

Roberts thought quickly. He knew that he couldn't tell McNeil that he had been talking to the woman, much less that they had introduced themselves. And especially not that they had an informal date the next morning. "Mailbox," he said quickly. "I tailed her into her apartment—it's actually a condo building. I saw her check her mailbox, and when she had gone upstairs, I checked the name on it. Jean Searles."

"Nice job," McNeil said, her pen poised. "What's her address?"

Damn it! "It's . . . uh . . . jeez, I can't believe I forgot it! I was keyed in to her name, see, and I didn't note the exact address."

McNeil gave him a look of tolerant amusement and reached for the phone book. "At least you knew which piece of information is the most important," she said, flipping through the white pages and then scribbling busily. "Here she is. All right, we've got a name and address! Good work!"

"Thanks," Roberts said, feeling guilty. "Do you think our killer has her name and address?"

"Not unless he did what you did," McNeil said with unconscious irony. Roberts cringed. The killer might have done what Roberts had lied about, but Roberts doubted that Jean Searles would go around introducing herself to just anybody. At least, he hoped not.

"So we're ahead of the game at the moment," Roberts summed up.

McNeil nodded quickly, obviously happy to dismiss that train of thought. "There's going to be a change of routine today," she said. "You're to report for the latest Virtual Training disk."

"What's the subject today?"

"The usual. More Shoot/Don't Shoot training. The department's been getting a lot of flak lately."

Roberts sighed. It wasn't that he minded the training; it was just that it took a lot out of a person. It felt so real that he was always completely wired for the rest of the day. From what he had heard from McNeil, that wasn't just a characteristic of the new Virtual Training—the old video wall training did the same thing. Even though it was obviously not real, you tended to focus in on it to such an extent that you bought into the whole concept. Not that the bastard technicians understood that.

He reported to the Virtual Training studio and got suited up. It took a lot more time than at Tessier's Virtual Motel, but that was because the po-

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lice training unit placed a different emphasis on the virtual capabilities. They were more interested in evaluating the responses of the participant than in providing perfectly believable entertainment.

Roberts struggled into a fully-wired suit, and slipped a heavily wired handgun into his shoulder holster. He took a deep breath, and nodded at the technician.

The van pulled over to the side of the road. Alex Roberts pulled up behind it and got out, leaving his police lights flashing. He approached the van cautiously, keeping an eye on the driver's door.

Suddenly the door of the van burst open and a man jumped out. He charged toward Roberts, digging for something in his back pocket, shouting obscenities.

Roberts immediately had his gun out, and was crouched behind the car door. "Police! Don't move!"

The man kept running toward him, and his hand was coming out from behind his body, holding something. "You goddamn pigs! You asshole!"

"Police! Don't move!" Roberts yelled again. He tightened his finger on the trigger, the gun lined up on the man's chest.

The man stopped about ten feet from the car, and Roberts saw that he was holding his wallet. "You goddamn cops," the man was yelling, "I can't drive down a single goddamn road in this city without being pulled over by one of you assholes!" He thrust his wallet toward Roberts, and the image froze.

Words appeared on the screen in front of Roberts's eyes. "Good judgment. No-shoot situation."

Roberts allowed himself a slight smile of satisfaction, and a sigh of relief. And then *he was walking down a bustling city street, calmly surveying the shop fronts. Suddenly, he heard a commotion coming from one of the shops ahead of him. Then came the muffled sound of a gunshot.*

Roberts pulled out his gun, and sprinted to cover. A large metal mailbox was on the sidewalk near the curb, and Roberts got behind it. He had just lined up his gun on the doorway when three people burst out. They all had guns, and one wore a mask.

"Police!" bellowed Roberts, his gun trained on them. "Don't move!"

They whirled toward him in surprise. The man in the mask immediately dropped a bag he was holding, and held up his hands. The man on the other side froze in place, a look of terror on his face. The woman in the middle looked at Roberts, and brought up her gun.

Roberts fired two quick shots—a double tap—before she could fire. The first shot missed, going over her left shoulder and burying itself into the siding of the building. The second shot caught her in the upper arm on the left side; she screamed and fell to the ground, firing blindly as she went down. Roberts didn't see where the round went, and was preparing to fire again when he saw that she had dropped the gun in the fall. He quickly shifted his attention to the other two, who had not dared move.

Words appeared on the screen,

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along with a new feature: more writing beneath it. It read: "Good judgment. Shooting situation. Means: established (armed with handguns). Intent: established (aiming the gun in a threatening manner). Proximity: established (proximity assumed when dealing with a gun).

Roberts sighed in relief again, and prepared for the next test. He knew he had a dozen more before he finished.

McNeil called him into her office when he had showered and changed, and gestured him to a seat while she looked over a computer printout.

"This is the printout of your performance this morning," she said, waving the sheaf of paper. "I'm supposed to go over it with you, talk over some areas where you may have made a mistake, and see if you have any questions."

"Cool," Roberts said. "How'd I do?"

McNeil checked the scoring directory, and looked impressed. "You did very well," she said. "Well above average in many areas. Let's see. You got a very high score on thinking on your feet. I've noticed that about you. You're fast; you're smart. You have the ability to come up with ideas that can defuse a situation, and you show good judgment on what to do, when."

"All right!" Roberts said, shifting his chair closer.

"You showed a low level of race sensitivity," McNeil continued. She stopped and reread the evaluation. "That's worded strangely. Let's see. Oh, OK. It's good to have a low score in this category."

"What's it mean?"

"It means that you're not sensitive to what race the people are. You're not more likely to shoot blacks than whites, for example. You're not likely to use more violence if the person is Hispanic than you would if the person was Caucasian. You show a good grasp of the specific guidelines for acceptable force, and you don't let it be colored by race."

"That's good to hear."

McNeil consulted the printout again.

"On the other hand, your marksmanship stinks."

"Stinks?!" Roberts repeated loudly. "Whattaya mean, stinks?"

McNeil looked at a chart. "Well, OK, it doesn't stink. But it's below average. You're due for some time at the firing range, my boy."

"OK," Roberts sulked.

McNeil was reading some fine print. Then she looked up at him. "You were using your Glock 10?"

"Yeah, why?"

"Well, I can't figure out how somebody could have bad marksmanship when you're using a namby-pamby gun like a Glock 10."

"Whattaya mean, namby-pamby?" Roberts protested hotly.

"Well, for crying out loud, it's got that silly targeting laser built right into it! I mean, you touch the trigger and a little red laser dot shines where the thing's pointed. The only thing it doesn't do is hold your hand while you squeeze the trigger. And it's got half the recoil of a .45. How can you miss with that?"

Roberts rolled his eyes. "You old-

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timers and your love affair with .45s! What makes them so much better than a 10 millimeter?"

McNeil glowered at him. "My old chief carried a wagon-wheel—a .38 revolver. Wouldn't give it up for anything. *He* was an old-timer. I'm just a traditionalist."

"Oh. Right. Good distinction."

McNeil ignored him and checked the printout again. "Do you think your marksmanship score is low because you're a bad shot? Or because you're not comfortable with the idea of shooting people?"

"I dunno," Roberts mumbled. "I suppose it could be some of both. I mean, it is a fairly major thing, shooting somebody."

"Of course it is," McNeil said. "That's why we have this training. The consequences for the department, and the city, and especially for you as an individual, are enormous if you kill somebody without justification. But you have to remember that when it comes to a shooting situation, it's either you or them. And it better be you. So, a little review: when you've established that it's a shooting situation, you shoot two or three times to the body—a Double Tap, or a Triple Tap. Then one to the head. So it's boom-boom, boom."

Roberts nodded, and McNeil continued.

"I used to have a problem with the third one to the head. But remember, you never shoot someone unless they're about to kill or seriously injure someone else. And even with two solid hits to the body, some people, especially if they're worked up or on drugs, don't know they're dead yet. They could still hurt someone. So if it's a shooting situation, you shoot until they're no longer a conceivable threat. Just remember; you're gonna be sued no matter what you do. But you can't do anything about it if you're dead. And I don't want to have to go to your funeral."

Roberts nodded humbly again.

"OK," McNeil said. "Now, the computer flagged a couple of instances where you could have handled the situation better. The most important one is where the smash and grab robber turned with the gun in his hand."

"I got him clean," Roberts protested. "My marksmanship was fine."

"I'm not talking about marksmanship," McNeil said sternly. "And it would have been called a good shooting. He displayed means, intent, and proximity. You had all the reason you needed. But you didn't notice that there was a parked car right next to you. You had time to jump behind it, where you would have been safe."

"And then what?"

"You would have had position on him, and maybe been able to force him to drop his gun without shooting him. He might have come after you, and you would have had a better tactical position than him. But as it was, bullets were flying around on a busy street corner. And, I'm glad to say, you got him instead of the other way around. You didn't do anything wrong," McNeil stressed. "It's just that there might have been an option that would have been a little better. That's all."

Roberts nodded slowly.

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McNeil checked the printout again. "Here's one I want to talk to you about. The computer says you did well. I think you did lousy."

"Which one was that?"

"The one where you were walking up to a suspicious car in the woods. You heard sounds of struggle inside. You challenged the car, a woman stumbled out, and a guy followed, hitting her repeatedly with a club."

"And I shot him," Roberts said defensively. "He was using deadly force. It was totally justified."

McNeil skewered him with her gaze. "Exactly. He was using deadly force. He hit her once as she was struggling out of the car, which made her fall to the ground. He followed her out of the car, and kept hitting her, ignoring your warnings."

"So what did I do wrong?" Roberts asked hotly.

McNeil looked disgusted. "Roberts, he hit her *four times* before you shot him! Any one of those blows could have killed her! It was a shooting situation after the first time he hit her! But you, like every other male police officer in the whole goddamned precinct, just let him beat her into the ground!"

Roberts felt uncomfortable. "She was blocking my view of him when he first raised the club," he said. "I couldn't have shot him then."

McNeil only backed off a little. "True. You shoot only when you have a clear shot, and there's no possibility of someone else catching the round. But what about all of those other times? Your visibility was sufficient to see him hit her the first time. She went down. Shooting situation, right now. As soon as you can fire without endangering her. But instead, you stand around with your thumb up your butt while he scrambles out of the car, takes two or three steps over to her, and hits her three more times before you shot the bastard!"

"Hey, it wasn't because I think it's OK to beat on women," Roberts objected. "I was issuing a verbal challenge, and I just couldn't believe he wasn't obeying. I mean, I had my gun lined up on him, he's only got a club and he can't reach me, but he still ignored it. It took me a second to realize that he wasn't going to listen."

McNeil ruminated for a minute. "Well, at least you shot him. Some of the jokers around here never shot at all. They just stood there, telling him to stop, while he hit her twenty times or more."

"There's no excuse for that."

"No shit!" McNeil flashed. "And those technicians who run the training room really pissed me off. You know how they set up each situation by telling the trainee the general outline of the situation? Well, they told some of the guys that they recognize the car they're going to investigate. That it belongs to the town drunk, who has been known to slap his wife around from time to time. *Those* trainees didn't even pull out their guns! They walked up to the guy, telling him to knock it off. They figured, it's only a guy hitting his wife. As if he had a right to do it. Meanwhile, he's killing her! God, I couldn't believe it!"

"When would you have fired?"

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Roberts asked cagily.

McNeil looked at him wryly. "Like you said, when he first hit her, she was between you and him, blocking your shot. So she falls and he climbs out. As soon as he raises the club to hit a second time, and you have a clear shot, you shoot him. Because that second blow could have shattered her skull."

Roberts nodded thoughtfully. "All men did lousy on this scenario?"

McNeil looked somber. "Some women too," she muttered.

Roberts felt relieved, but tried not to show it. "Women too, huh?"

"Not as many," McNeil said with a warning in her eyes. "But one was pretty upsetting. She didn't fire at all. The instructor told her that the guy had been using deadly force, so why hadn't she fired? She told him that her ex-husband had hit her harder than that, and she had never felt like she was going to die."

"Ho-ly shit!"

"Yeah. I had to work with her a lot. But here's what I'm saying. Something about this scenario has made a lot of people forget the guidelines for use of deadly force. So I'm going to spell them out for you like the greenhorn you imitated in there. First, you always use one higher level of force than your opponent. If your opponent is unarmed, you use your club. If your opponent has a club or knife, you use your gun."

"I know this stuff," Roberts said in annoyance.

McNeil waved the printout in front of his face. "This says otherwise. Listen up. He was using a club, so immediately you use your gun."

"I did!"

"Fine so far. You use your gun when he displays means, intent and proximity to you *or anybody else!* He displayed means: he had a club. He displayed intent: he was hitting her with it, although just raising it in a threatening manner is enough intent for anybody who isn't blinded by testosterone, since his first strike could have killed her. And he had proximity: he could reach her with his club. It doesn't matter if he couldn't reach you—he could reach her. So you shoot."

"Yes, I know," Roberts said in exasperation.

"No, you didn't know. She could've died while you waited. You screwed up. Don't do it again."

"I won't. I swear."

"Yeah, right." She looked frustrated and angry. "Get out of here. As far as I'm concerned, there's only one decent man left in the world, and I'm going home to him before I flush all of the rest of you down the toilet."

Roberts sat at a table in the deli the next morning, still a little shaken. Tangling with McNeil was like tangling with a starving tiger. Normally he could handle McNeil better than most people, but not on some topics—and not when he knew she was right.

He straightened his tie again and tried to shrug it off. Jean was probably going to show up any minute, and he wanted to be ready. He tugged the sleeve of his best suit jacket to eliminate a wrinkle. He wanted to look

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good.

Why? Well—because if she liked him, he'd have more of an excuse to be around her. That's why. No other reason.

He looked up, and she was there.

She was dressed in a deep blue outfit, with a dark green scarf that he was almost sure matched her eyes exactly. Was her hair, her outfit, a little more carefully done than on the other days he'd seen her? He couldn't tell, but it seemed like it. He glanced at her feet as he stood to meet her. Dress shoes. Not tennis shoes.

"Good morning," he said, giving her his best smile. He felt himself blushing slightly, and tried to stop.

She gave him a beautiful smile, and he saw it soften a bit as he blushed in response.

Alex had already stopped at his favorite shops, and began dishing out the warm bagels with the fresh cream cheese and smoked salmon. He broke the ice by expounding at length on how good the stuff was, and where he got it.

Jean seemed relatively at ease as they began to eat, and smiled as he chattered on. When he finished, she raised a question.

"What brings you to the St. Paul public transportation system?" she asked casually.

"It's a temporary thing, really," he said. "Probably not for more than a month or so."

"Really. What do you do?"

From long experience of questioning suspects Roberts had learned that when you have to lie, make the lies as small as possible. It's less to keep track of later.

"I'm a police officer," he said, and watched for her reaction. Criminals looked alarmed. Snobs looked condescending, for reasons he couldn't fathom. Some women immediately shied away, not wanting to get involved with cops. But Jean responded in the best way: he could see that her immediate reaction was to trust him more. To top off the effect he showed her his badge, and she was suitably impressed, although she also looked a little confused.

"What's a policeman doing riding a commuter bus downtown?" she asked.

Now for the lies. "We're conducting a spot safety evaluation," he said thinking quickly. "We choose specific buses and ride them for a while, to determine the degree of danger to the passengers."

"Danger to the passengers?"

"Sure. Assaults, robberies, that kind of thing."

"I thought that sort of thing mostly happened in Minneapolis," Jean said.

"Well, you're right," Alex said. "But the difference between us and the flatfoots in Minneapolis is that we're being proactive. Based on our reports, we're going to adjust the schedules of the patrol cars, fine tune the security schedules, and notify any appropriate social service agencies if we see a problem area. Why wait until something bad happens before you act?" He kept the irony of his statement to himself.

"Well, I'm very impressed," Jean said, sitting comfortably. She seemed relieved to be able to stop worrying

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about physical safety and concentrate on making a good impression. She told him about her job, and talked about some of her coworkers. Then she told him about her bad experience in the church parking lot.

"What a jerk!" he said darkly. He shook his head and flashed a half smile. "I hate it when I feel like I have to apologize on behalf of my gender. But I guess you run into guys like that every once in awhile."

Jean just smiled.

"But you handled it very well," Alex finished. "You kept your cool, didn't show fear, and you stood up for yourself."

They steered to more pleasant topics, and suddenly it was late.

"Listen," Alex said as they walked quickly toward the bus stop, "I'd really like to take you to dinner sometime."

"When?"

"Ummm . . . tonight? We could meet at a place that you're comfortable with. Maybe a place you could walk home from if you wanted."

She smiled reassuringly. "I appreciate the thought, but I'm not worried about it."

He laughed. He had a nice laugh. "Sometimes, being a cop has its advantages."

They were lucky enough to find seats across the aisle from each other, and they chatted pleasantly during the bus ride. He was sorry when her stop came, and he walked her to her building again. There was a moment of awkwardness at the door.

"Well," he said, "I'll see you tonight? We can ride the bus and go to a restaurant on Grand?"

"That sounds very nice," she said smiling.

He was looking into her eyes, returning her smile, when he remembered that Boegemann could be watching. He quickly looked around, but a scan of the crowd revealed nothing. He looked back at her, and noticed surprise and a trace of worry on her face. He smiled reassuringly at her. "I'll see you tonight."

"Yes." The look remained.

He left, letting his glance linger on her.

Jean waited for the bus in blissful anticipation, looking around often to see if Alex was at the stop yet. She tried to calm herself. Just because she had told Amy and Barbara all about this guy didn't mean that it was necessarily going to work out. She had to remember to be picky, and not tolerate some unacceptable behavior just because she was crazy about him. Although, she had to admit, he was looking awfully good so far, even though their parting had been kind of strange that morning. Well, he had a chance to make it up to her.

She looked down the street and saw him walking toward her. She gave him a big, delighted smile, and had no idea that it doubled his blood pressure.

"Hello," he said happily, walking up to her.

"Greetings and salutations," she grinned. He looked great. Nice and tall, well groomed without trying to look like a catalog model, and a great build. They chatted lightly, and she

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pretended not to notice when she saw him glancing at her legs, but was very pleased. She knew she had decent legs, and as long as he was interested in the rest of her too, she was happy to let him see them.

For the first time in her life, the bus ride was too short. But fortunately, their dinner date was still on. She listened attentively as he described the place; an Afghan restaurant on Grand that she had noticed before. He had obviously put a lot of thought into the event, which boded well.

When they finished the meal and got up to leave, she checked her watch and was surprised. Two hours! She couldn't remember the last time she had taken two hours for dinner, but the time had really flown past.

The sun was setting as they strolled from the restaurant, but it was a beautiful night. She couldn't remember which one of them had suggested going for a walk, but she quickly changed into her tennis shoes, and they strolled down Summit Avenue. They walked down the wide median and talked incessantly, enjoying the view of the brightly lit mansions on each side of the street.

Jean was having the time of her life. She felt so comfortable talking to this man, and the fact that he was a cop helped a lot. Summit Avenue and the River Boulevard were not safe places for women at night, but tonight she felt completely safe.

From Summit they turned south on Mississippi River Road, and didn't stop until they reached Ford Parkway. Jean checked her watch again, for the first time since the restaurant, and gasped in surprise.

"It's two thirty in the morning!" she cried.

"Good grief!" he said. "I feel like I just started talking to you!"

The comment made her feel warm all over, because she felt the same thing.

The distance back to her apartment could be measured in miles, but neither of them minded. The distance, the lateness of the hour, the need to go to work the next day, all were irrelevant. They talked the whole time, and when they were standing on the landing outside Jean's door, it was close to four in the morning.

Jean didn't care. She smiled warmly up at him, and he smiled back. For the first time all evening, they had nothing to say. She reached up and kissed him on the cheek.

"Good night," she said. "Thank you."

"Can I call you?" he asked.

"You'd better."

They both smiled, and she went inside.

Alex called her the next day, and they set up another dinner date for the day after. He took her to one of his favorite restaurants in St. Anthony Park, and then they decided to drive across the river to Minnehaha Park in Minneapolis.

They strolled toward Minnehaha falls, talking quietly. There weren't many people around, and Alex was enjoying the privacy. Feeling daring, he waited until they were in a darker part of the path, and went for her hand. He missed on the first try, just

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brushing the back of her hand with his. He went back for another try, and found her hand open and waiting for him. She laced her fingers between his—long, silky fingers on a strong, feminine hand. He felt a thrill like he hadn't felt since high school. He briefly looked around to make sure McNeil—no, Boegemann—wasn't watching, and then looked at her again. She was smiling up at him.

They strolled to the bridge that spanned the falls, listening to the roar of the water as it plummeted down. They stood at the bridge, and she let go of his hand to stand closer to him. He put his arm around her and they stood for awhile, Roberts wondering when he should try to make his move. Heart pounding, he worked up his courage and leaned in toward her. To his surprise, she was leaning in toward him, and their lips met halfway.

Her lips were firm and moist, and her kiss was electric, tingling down to his toes. He opened his mouth slightly, and she responded in kind as he pressed his lips more firmly against her—

—Her soft, full, pouting lips, and he smashed his fist into them and she fell backwards with a scream, her mouth covered in blood as he—

With a gasp of alarm, Roberts pulled back and looked wildly around, but nobody was there. He looked at Jean, and his heart wrenched at the confusion and hurt in her face. Roberts was breathing quickly, and felt badly shaken. Jesus! Oh, Jesus, Boegemann was really getting to him! His mind racing, he looked at her and tried to think of an explanation. Couldn't he even look at a pretty woman any more?

He forced a smile to his face. "I'm sorry," he said to her as she looked questioningly up at him. "Could we try again?"

"I think that would be a good idea," she said.

So he did.

A couple of days later they saw each other again, and Alex was struck by how comfortable he felt around her, how easy it was to talk to her, and how she seemed more and more attractive each time he saw her. He drove her home after a concert at the Ordway, and they both hummed the tunes they had heard. He held her door for her, and they strolled slowly up to her apartment door, holding hands.

"I had a great time," he told her.

"So did I," she said. "Thank you very much."

He smiled happily. "You're welcome."

He reached for her gently, and put his arms around her. She smiled as she brought her arms up around his neck, and he kissed her deeply. He tightened his arms around her, and her body pressed into his with a delicious softness. Oh, this was good, this was—

—Her soft nubile body as he tore her last shred of clothing off, and she screamed again, yes, oh she screamed as he brought out his knife and—

Oh, Jesus, not again! Roberts stiffened quickly, drawing his body away from hers. He managed to keep kissing her, but there was no way she

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wouldn't notice his reaction. That goddammed Boegemann and his fantasies, that goddammed technology that made it feel like you were doing it, that polluted your mind with it and ruined a beautiful romantic moment . . . she broke off the kiss, looking hurt and confused again.

Roberts quickly leaned forward and gave her a quick kiss. She looked like she was going to say something, but apparently changed her mind.

"Goodnight," he said lamely.

"Goodnight," she said, in a tone he couldn't read.

She went inside and closed the door firmly. He left, swearing to himself.

Roberts slouched in the chair in McNeil's office, and watched blearily as she connected the hardware to the computer monitor.

"How do you stand it?" he finally asked her.

"Stand what? Watching this garbage?"

"Exactly. How do you get through it?"

"I hate it. It gives me nightmares."

Roberts shifted uncomfortably. "What about . . . well, what about romance? Does it put a crimp in that?"

McNeil looked at him curiously. "Why do you ask that?"

"It bothers me. I can't even look at a woman any more without feeling guilty."

McNeil nodded somberly, but looked interested. "Usually you talk all about your girlfriends, but I didn't know you were dating somebody right now."

"Who said I was?" Roberts retorted, a little too heatedly. "I'm just talking in general. Noticing women on the street, that kind of thing."

"Oh. Well, I guess it doesn't bother me that way quite as much, because I have a lot of background and memories with Bob that supersede this crap. But I can see where it would really put a crimp on something new."

"I don't have anything new. I was just wondering."

McNeil looked at him oddly. "You going to be OK?"

"Sure. This just really bothers me. Can't you have your husband put in something that will let us adjust the realism factor when we're monitoring? So we don't have to feel like we're Boegemann?"

"I suppose he could rig up something like that," McNeil said thoughtfully. "But I don't think it would be a good idea."

"Why *not?*"

"Because there's a lot more to the fantasies besides the visual. We're learning what he thinks, what he likes, why he does different things. If he formulates any plans to do this for real, it probably wouldn't be communicated to us unless we've got it on high realism."

"I hate this," Roberts muttered.

"Trust me," McNeil said with deep feeling. "So do I. Just focus on the fact that what we're working on is designed to prevent a murder. I don't mean solving it after it's been done—stop it from happening in the first place. I don't know about you, but that really speaks to me."

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Boy, oh boy, me too. Roberts thought. But aloud, he only said, "Good point. Let's take a look."

He slapped her to the floor, the adulterous slut, and she screeched as she went down. He began beating her, oh, she deserved it, the bitch, yes, hit her again and hear her scream! 'You cheating slut, you whore, you bitch!' he yelled over her screams, yes she screamed, and she deserved it, yes, she deserved the knife!

McNeil turned it off, feeling ill. She looked at Roberts, who was gray and pale. "She's got a guy," she said.

"Apparently."

"This could be bad. It may be the thing that pushes him over the edge. I wonder who this guy is. He's pretty shadowy; not much detail. Did you notice anything?"

"No," Roberts said, and cleared his throat a couple of times. "But I'll keep a closer watch."

Roberts knew the evening wasn't going well. He was jumpy and uncomfortable, and Jean was uncharacteristically quiet. It bothered him —well, lots of things bothered him. He wasn't supposed to be dating her. He wasn't supposed to be falling so completely in love with her. And he wasn't supposed to feel sick and guilty every time he looked at her and appreciated her beauty. Watching the Virtual fantasies of that bastard Boegemann had really screwed him up.

They got back to Jean's apartment, and she invited him in—kind of firmly, it seemed to him. They walked into the living room, and she sat him down. She didn't offer him a seat; she sat him down on the couch. Then she pulled a chair up near him, and sat down, facing him.

"All right," she said. "What's wrong?"

"Wrong?" he parrotted stupidly. He looked at her with sick eyes. *I can't tell you what's wrong,* he thought.

"Yes," she said, looking straight at him. "I can't figure you out. Sometimes you act like you're glad to be with me—"

"I am!" he interrupted fervently.

"—But other times," she pressed on, "you act like you're crazy with guilt! Like you shouldn't be with me at all."

He felt her eyes boring into him. "I'm sorry," he said lamely.

"Are you married?" she demanded.

"No! God, no!" he laughed. "If you want, I'll give you access to my police personnel files to see for yourself. I'm not married, Jean. But I'm crazy about you."

He saw her relax a little, then tighten up again in determination. "Then tell me what's wrong, Alex! If you're so crazy about me, why do you keep acting so weird?"

He made helpless gestures. "I don't know."

"Listen," she said, moving her chair forward. "I've had guys treat me like a china doll. I've had guys turn into octopuses and try to grope me all over. One jerk, on our first date, kept trying to push my face into his lap. But nobody has treated me like you."

"Well, you see, that's exactly it!" Roberts said fervently. "I don't want

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to act like one of those jerks. I've never been able to stand those slick ladies' men. I swore I'd never look at you like some blow-up doll. So maybe I'm overcompensating. That's all," he finished lamely. It was as close as he could come to describing his hate for the way Boegemann was looking at her.

"Alex, sweetheart," she said more gently, "that's very sweet, but you're overcompensating about a million times too much. You can treat a woman with respect, and still find her desirable."

He shook his head miserably. "I'm a cop. You should see the way some guys treat their wives, or their girlfriends. A guy will swear that he loves her, and she's lying dead at his feet. Or a guy will be convinced that he had the right to rape a woman because she happened to be in his vicinity. Or because she was wearing those blue jeans. Or that sweater."

She reached over and took his hand. "I'm sorry," she said gently. "I didn't know what you run into every day. But Alex, you have to understand—lots of couples make love without exploiting each other. If a woman says to stop and you don't, then it's criminal. But if it's done with mutual tenderness and respect, then it can be beautiful."

He started feeling better. "Well, intellectually, I always knew that. I guess I just needed to be reassured." He looked into her beautiful, deep eyes. "I want you to know that I find you incredibly attractive. And if you're ever ready for us to progress to the next stage, you just say so."

"I'm ready," she said.

He started in surprise, then laughed and hit himself on the forehead. "God, I've been an idiot!" He held out his arms. "Come here."

Roberts sat at his desk, staring dreamily at the wall. Suddenly, a piece of wadded paper hit him on the side of the head, startling him out of his reverie. A bunch of guys laughed.

"Christ, Roberts, you're off in the stratosphere somewhere," Thorson said, tossing another paper wad. Roberts deflected it and tried to keep from blushing.

"Look, he's turning red!" Anderson jeered in a friendly way. "What's with you, Roberts? You got a woman or something?"

"I ain't saying, especially not to you jackals," Roberts said loftily, and ignored the hoots of derision they rained on him. Even if he could tell them about Jean Searles, he wouldn't tell them about the long period of kissing and caressing, the whispered endearments, the clumsy fumbling with each others' clothes, the feel of her body, and the sheer beauty of her passion. He wouldn't tell them about looking into her eyes and stroking her hair, and holding her after they were finished, and the promises said and the—he jumped as another wad of paper hit him on the forehead.

They rained insults and laughter on him, ducking as he flung erasers and desk paraphernalia at them. And then McNeil's door opened and she stuck her head out—the reminder was like a bucket of cold water dumped over him.

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"Ready?" she asked, ignoring the other cops as they scrambled to regain some dignity.

Oh, Christ, Roberts thought bleakly. *I actually forgot for a minute.* But all he said was, "Ready." He got up and walked into her office and closed the door.

McNeil didn't say anything as she handed him his goggles. Her face looked tense and strained. Roberts felt an incredible tension as he waited for the picture to appear. He was monitoring the criminal fantasies of a man who wanted to kill the woman he loved. He considered excusing himself to go to the bathroom, but knew it wouldn't do any good.

She was sitting naked on his lap on her couch. Her mouth was open, and she threw her head back in ecstatic delight as the guy took her breast in his mouth. Her hands cradled his head, and she emitted small sounds of exquisite agony as she gave quick thrusts with her pelvis. The guy switched to her other—no, forget the guy, concentrate on her, her blonde hair swaying with her motion, and she was whispering, moaning, "yes, oh, yes, oh Alex"—no, forget the guy, she's just moaning and thrusting, thrusting and pounding, and her cries got louder and louder and—

McNeil hit the power button and peeled off her goggles. She turned to look accusingly at Roberts. He looked back with sick eyes, his face completely gray in shock.

"Jesus!" he whispered. "He was watching! Oh, Jesus!" His mouth worked violently as he tried not to throw up.

McNeil stared at him, her face an angry thunderstorm. "I suspected as much. I thought you were involved with her."

"I was going to tell you," Roberts said feebly.

"No, you weren't."

Roberts didn't reply.

McNeil leaned forward angrily. "Do you know how stupid you're being? How can you possibly think clearly, and behave like a cop, when you're involved with her? You won't be able to help her!"

"I didn't decide to fall in love with her! It just happened!"

"Oh, my God!" McNeil groaned in disgust. "You're in love with her! It wouldn't be just a one night stand, no, you've got to go and fall in love with her! Oh, great! Just wonderful, just absolutely fucking wonderful!"

"Don't talk about her like that," Roberts said angrily.

"Watch your mouth!" McNeil roared. "Maybe you don't realize that you've committed a serious breach of procedure! I could have your ass out on the street without a badge in thirty seconds!"

"Yeah, right!" Roberts retorted. "What are you gonna write in the report? That I got involved with a woman that we're conducting covert surveillance on as a result of breaking and entering to obtain illegal evidence? Give me a break! You'd rot in jail, and so would I!"

There was a deadly silence, and McNeil's eyes burned in anger. "Have you told her anything?" she asked after an enormous internal effort to reduce her anger.

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"About this? No."

"Amazing. Some indication of intelligence still exists."

Roberts stared at the blank screen. "Christ, I can't believe it. He was watching! I want to go take a shower for a year!"

"He's closer than we thought," McNeil observed. "He knows where she lives, and how to see inside her apartment without being seen himself."

Roberts wasn't listening. "He's so sick! It was loving and beautiful, but he changes it to violence, or a bunch of mechanical parts grinding away!"

"Let's apply ourselves to the problem at hand," McNeil said firmly.

"You don't understand!" Roberts protested. "I looked into her eyes and kissed her soul! I've never felt anything like that—ever!"

McNeil shook his shoulder more gently than she wanted to. "Alex," she said in a more friendly tone, "we've got a problem here, and you're going to have to pull yourself together." She got him a cup of water and sat there patiently while he sipped at it.

"Now, let's give this some thought," she said after a long pause. "Do you know where he was, to be able to see like that?"

Roberts shuddered. "He must have been up on the roof. The angle of sight works. She's got a skylight onto her living room."

"How would he have gotten up there?"

"I don't know."

"Do you think he followed you? Or do you think he was waiting there?"

"I don't know. He might have followed us. I wasn't paying attention."

McNeil shoved him in exasperation. "*Always* pay attention! Always!"

He took the rebuke with a bowed head.

McNeil tried again. "Is the skylight big enough for a man to fit through?"

"Yeah. It's pretty big."

"So we know his vantage point. That's something, anyway." McNeil paused, and looked at Roberts. He still looked sick. "We've had enough here," McNeil said. "Why don't you go back to your desk and do some paperwork? Take some time to pull yourself together."

Roberts left obediently. McNeil watched him go in silence, and waited for her door to close. Then she put her goggles back on and watched as Boegemann, in his fantasies, crashed through the skylight and murdered them both.

Part Three: PROXIMITY

Jean found herself humming happily as she bustled around the office. Even when the Fax From Hell started acting up again, she didn't care. She smiled tolerantly at it, briskly ripped the paper from the holder, and shoved a new sheaf in. Cowed, it began transmitting normally. A minor triumph; sometimes, everything seemed to go right.

She kept thinking about the night: the sweet way his hands shook as he unbuttoned her blouse, the fabulous way the muscles in his arms and stomach rippled, his strength and gentleness. . . .

Glen's phone rang, and she picked it up. It was another rude, demanding

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salesman—she recognized them immediately. He had to get through to her vice president—it was a matter of life or death. He was returning her boss' call. She smiled and put him on hold.

"Glen," she called into his office.

"Yes?"

"There's another creep on the line. Can I send him through?"

"Why not?" he called. "I feel like it this morning."

She smiled in anticipation and reopened the line. "Mister Jenkins will speak to you now," she said, relishing the hidden meaning in the words. She patched him through.

Amy poked her head around the corner. "Well, don't you look radiant this morning! Can you get away for a coffee break?"

Geez, this was shaping up to be a great day. "Sure," she agreed happily, and followed Amy down the hall. She could hear Glen's voice as she walked out of earshot: "... And you told my secretary that I called you. I *never* called you! I don't even want to *talk* to people like you! I'm writing down the name of your company, and I'm going to order our purchasing department to never ..."

She smiled in triumphant satisfaction.

"Did you win the lottery or something?" Amy asked curiously.

"What? No, why?"

"You seem much happier than anybody has a right to be. What's the deal? Did you find a nice guy or something?"

Jean laughed and dodged the question. "The odds of that are worse than winning the lottery," she joked, and Amy laughed in appreciation.

The old crowd was sitting around a table in the lunchroom, and they made room for Jean and Amy. Barbara looked closely at Jean's face.

"Somebody got some last night." she announced.

Barbara was too sharp for her own good. "What did you get?" Jean asked innocently.

"Come on," Barbara persisted. "Nobody beams like that around here unless they got some serious loving last night."

Seven eager faces turned to hear Jean's answer. Normally, she could handle Barbara easily, but today she just couldn't stop smiling radiantly. Seven women took that for her answer, and pelted her with excited questions.

"Jean!"

"All right!"

"Who is he?"

"Why didn't you tell us about him?"

"Come on, tell us!"

"Details! Details!"

Jean laughed delightedly, and tried to hide her smile behind her coffee cup. "I'm afraid you're all just going to have to wait for the movie to come out," she said demurely.

She leaned back in her chair, smiling widely as they continued to pelt her with questions and congratulations. She felt almost giddy with happiness. *I'm giggling like a teenager,* she told herself. *Act your age, girl!*

Or maybe, she figured, she had a right to it. She hadn't laughed this much for a long time.

"Three times," she said in answer

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to an oblique question, and basked in the shrieks of laughter and appreciation.

Roberts slumped at his desk and stared at the far wall, wallowing in despair. Jesus Christ, how could things get so screwed up? How could he fall in love with a murder target? How could an asshole like Boegemann just pick a person to kill at random? How would he have met Jean if it hadn't been for Boegemann? He should just quit the department right now—grab Jean and run away to the Yukon or something. He should just hunt Boegemann down and shoot him, and the hell with the repercussions. He should—McNeil's voice pulled him back to reality.

"Roberts! Wake up! Come in here." She closed her door with a thud.

Obediently, he got up and shuffled toward her office. Thorson leered at him.

"Spending an awful lot of time with the lieutenant, aren't we?" Thorson jeered, waggling his eyebrows.

"Not McNeil," Roberts snarled, in no mood for any shit. "It's your mother. She gives rebates."

"Hey! You asshole, you—" Thorson's protests were cut off as Roberts opened McNeil's door and slammed it behind him.

"What?" he demanded belligerently.

McNeil jerked her head toward a chair. "Sit down, loverboy."

He sat, making sure he was glaring at her. McNeil looked at him icily.

"I can do without the attitude," she informed him. "As a matter of fact, I can do without a lot of things right now, the main one being you. I can also do without the phone call I just got from our friend, Stuart Tessier, asking if we'd changed our minds about what we'd seen at his motel. It's getting harder and harder to lie about this. It's getting harder and harder to put up with you. But I'm stuck with you, and don't have much choice but to use you."

"Gee, I'm overwhelmed with sentiment," Roberts bitched.

"Shut up," she said briefly. "Your irresponsibility has put your lady friend in serious danger."

Roberts was suddenly paying close attention.

"This Boegemann character," McNeil went on, "might be spurred to action that he otherwise might not have taken—at least, maybe not as soon. But I don't think it's unreasonable to anticipate some jealousy on his part, do you?"

Roberts shook his head.

"And if he's jealous," McNeil pressed on, "he just might do something. Something violent. He knows where she lives. He has access to her apartment. It's a bad situation—one where even if your lady friend—"

"Her name is *Jean*," Roberts grated, interrupting.

"All right, a situation where even if *Jean* is taking all intelligent precautions, it may not be enough to keep her safe. Do you agree?"

"Yes, I agree," Roberts said impatiently. "What's your point?"

McNeil shook her head wearily. "You were promoted because you were reported to have a brain," she

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said irritably. "Use it! We need a plan, jackass!"

There was a long pause while Roberts thought laboriously. Finally, he shook his head. "All I can think of is shooting the guy on the street. Or grabbing her and running away."

"It's like I told you—you're useless to her now. You're too bound up in the thing emotionally to be able to help her."

Roberts had no answer, because he knew it was true.

"This shows how far gone you are," McNeil observed. "The plan is pretty simple at this point. You'll probably even like it."

"What is it?"

"Stay with her. Stick to her like glue. Be her bodyguard while I check out Boegemann."

Roberts brightened considerably. "I can do that!"

"I thought you could. Just try to do some of your thinking with your big head, all right? The only thing worse than her getting killed is both of you getting killed."

"I know," Roberts said.

"I don't believe you," McNeil said. "So I'm going to tell you. Always carry your gun. Always have quick access to your gun, even when you're in bed. Remember the skylight, and don't imagine you're safe just because the door's locked. Make sure you're always here when we monitor his fantasies so that if he switches from knives to sniper's rifles, we'll know about it."

Roberts nodded.

"And for God's sake," McNeil added, "if you're going to bend the rules for deadly force—like if he ever shows means and intent but not proximity, but you decide to invent that—make sure there's nobody else around to contradict you!"

Roberts nodded again, grimly.

"I'd suggest surprising her after work with flowers," McNeil said.

"What kind?" Roberts asked eagerly. "Roses, d'you think?"

McNeil gave him a look of pure exasperation, and Roberts scurried out.

Jean was puttering around, avoiding doing the dishes, when there was a knock on the door. She checked through the peephole and saw Alex standing there, holding flowers. With a thrill of happiness and anticipation, she opened the door.

He stood, smiling shyly at her. She smiled back.

"Hi."

"Hi."

Roberts pulled himself back out of the reverie of gazing at her. "These are for you."

Roses. A dozen long-stemmed red roses. She buried her face in them and breathed in their message. How long had it been since she'd gotten a dozen long-stemmed red roses? "They're beautiful," she said, and kissed him.

She invited him in, and waited as he shut and locked the door. She caught his eyes wandering along the opening in her blouse. She smiled quietly, and went to put the roses in a vase. Did she have a vase? How long *had* it been since she'd gotten roses, anyway?

She shrugged the thought from her mind, and improvised with a tall wa-

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ter glass. *I'll get a beautiful crystal vase for them,* she promised herself. She looked at him, catching him glancing at her behind. *Tomorrow,* she amended.

They went into a clutch in the kitchen, but when Jean moved toward the couch, he stopped her and picked her up. "You're going to slip a disk," she warned him, but he just laughed and carried her into the bedroom and shut the door with his foot.

They took their time, kissing and caressing, and slowly taking off each others' clothes. Jean felt a rush of happiness as they began to make love. He was so gentle, so loving, so romantic—even down to how he kept tenderly kissing her right cheek.

McNeil sat at her desk and simmered with anger. She hated working at the office when she should be home, but didn't think she could justify much more official time spent on this project. She hated working around the established procedures. And Roberts, who had been the most promising officer in years, had turned into some kind of stud-for-brains Romeo who couldn't even think straight. More and more, she wondered if they would be able to protect this woman without ruining both of their careers, or even getting killed.

She called up the Priors program, and set her computer to search for Boegemann, Stanley. She leaned back as it searched, and thought about the situation.

She felt a real bond with this woman, Jean Searles. McNeil didn't blame her for getting involved with Roberts—he was, after all, a remarkably decent guy, and pretty good looking now that she thought about it. But McNeil blamed Roberts for getting swept away; for forgetting what he was there for; for displaying such an appalling lack of judgment; and most of all, for endangering all three of them.

Her computer beeped and announced that Boegemann, Stanley had a clean record in the state of Minnesota. The program asked if she wanted a national search, and she hit the "yes" key. She glanced at her watch and sighed. Here she was, working late again. It was becoming more and more necessary as she spent time on this secret case, and she hated it. Roberts was probably getting laid even as she sat there, and meanwhile Bob was probably eating dinner alone and once again rehearsing his "while I understand and support your chosen profession, I have some reservations . . . " speech.

The computer beeped again, announcing that Boegemann, Stanley had no criminal record in any state of the union. She skipped through the disclaimer/advice screen that pointed out the limitations of a Priors search based solely on a name that might or might not be the person's real name, and turned off the computer.

She left the office, and decided to drive past Boegemann's address on her way home. It was kind of on the way, in the Selby/Dale area that used to be real dangerous, and was now a haven of Yuppie condominiums. She cruised slowly past his condo build-

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ing, but gathered nothing except the apparent wealth of the owners. Shaking her head in disgust, she headed south to Summit Avenue, took it to Cleveland Avenue, and went south to her house a couple blocks from the College of St. Catherine.

The house was dark as she drove up. Bob must have gone to sleep already. She let herself in as quietly as possible, and quickly scanned the inside of the house.

"Good evening," a voice said quietly.

She started. "Bob! What are you doing?"

Bob stood in shadow, with a dim illumination behind him. "Welcoming you home, dear," he said softly. He held up something in his right hand, and she made out the dim shape of a bottle of wine. "Why don't you come into the bedroom, and we'll discuss it further?"

She found herself smiling uncontrollably. "You nut. I thought you were going to be annoyed."

"Well, I was for awhile," Bob admitted. "But I figured that the Wine And Romance approach gave me a better chance of getting some action."

She began quickly undressing in the hall. "Oh, absolutely. You're right again."

Alex and Jean walked slowly through Como Park, chatting happily as they looked for a spot to spread their picnic blanket. The sun shone brightly, there was a nice cool breeze blowing. It was a perfect afternoon. Alex looked at Jean, and she smiled at him, the sun turning her blonde hair into a halo around her face. He smiled back.

I have never, he thought, *felt as happy as I do right now.* He spotted a shady spot under an elm tree, and pointed. "How about over there?"

"Great," Jean agreed, and they headed for it. Alex stood holding the picnic basket while she spread the blanket, and he took a minute to look around and drink in the scenery. It was so pleasant, with families playing in the park, little kids swinging and playing on the seesaws, some guys tossing a Frisbee, a kid and his dad flying a kite. . . .

"That's funny," he said.

"What?" Jean asked.

"There's a car parked in the woods over there," Alex said.

"I don't see it," Jean said, squinting where he pointed.

"It's pretty far in there," Alex said.

"Oh. What about it?"

"I wonder what it's doing there," Roberts said. "The rest of the cars are in the parking lot."

"Alex, sweetie, you're off duty," Jean reminded him.

"I know," Roberts said. "But I'm going to take a quick look. I'll be right back."

"Do you have to?" she asked, starting to walk with him.

"Yeah. But you wait here."

She stopped reluctantly.

This is just great, Roberts thought. *Why am I a cop, anyway? Here I was, having a great time, and now I'm investigating a suspicious car. Way to ruin a romantic afternoon.*

He swore to himself, and then fo-

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cused on the car. It was rocking slightly. *Probably just a passionate couple,* he thought. *If I was on duty, I'd suggest they go home, but now I'll just let them—that looks like a struggle!*

He walked faster, and heard a woman yelling. She struggled up out of her seat, but a man pulled her back down. "Get your hands off me!" she exclaimed, her voice heavily muffled by the closed car. "Ow! You're hurting me!"

Roberts had heard everything he needed to. He dug out his gun and hurried forward. *Shit, I feel naked without my vest,* he thought, and then called out loudly, "Police! Don't move!"

"There's the police!" he heard the woman exclaim wildly, sobbing in fear. "Help! He's trying to rape me!"

"Police! Don't move!" Roberts yelled again, and the guy's head appeared in the window.

The woman made a break for it, wrenching open the car door and stumbling out. "Help me!" she cried. She regained her balance and started to run. The man swung a pipe at her, and narrowly missed her as she ran.

With the appearance of a weapon, Roberts had his gun trained on the car. "Police! Don't move!" he yelled a third time.

The man inside the car cursed violently, and clambered out of the car. He brandished the pipe menacingly. "C'mon, asshole," he snarled.

"Police!" Roberts yelled. "Don't move! Drop the pipe!"

"Make me, you fucking pig," the guy yelled, waving the pipe around his head, but making no move toward Roberts.

"Drop the pipe!" Roberts commanded. He was a good fifteen feet away, and the guy had no way of hurting him unless he charged. Roberts almost wished he would.

"Go to hell!" the guy shouted. He took one step toward Roberts, and stopped, brandishing the pipe.

I'm getting nowhere fast, Roberts thought. He aimed carefully, then touched the trigger lightly. The Glock's laser-aiming beam glittered on the guy's forehead, and dazzled around his eyes.

"Shit!" the guy exclaimed, startled.

"That's where the bullet will hit," Roberts snarled. "Drop the pipe!"

"Jesus!" the guy said. He dropped the pipe quickly, and stepped back, raising his hands.

"Step away from the pipe!" Roberts ordered. The guy obeyed.

"Lie down on the ground!" Roberts commanded, wishing he had some handcuffs. When the guy complied, he ordered him to spread his arms out, and turn his palms up.

"This is the police!" a voice yelled from behind him. "We have you both covered! Nobody move!"

Oh, Christ, Roberts thought. He froze, keeping his eyes and gun on the rapist. "I'm a police officer!" he yelled back at them.

"Yes, sir," the voice said. "We have you and your suspect covered. Put down your gun and provide identification."

This is not going well, Roberts thought in frustration. He put down his gun, and two uniforms rushed for-

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ward. One of them covered his suspect, while the other examined his ID. Roberts looked past him to see Jean standing at the edge of the woods, watching. He cursed to himself again.

"Sorry, Sergeant," the uniform said. "We had to be sure."

"I know," he muttered. "Charge that guy with assault and resisting arrest. I'll come down and write the report later." He looked around, and saw that Jean was comforting the woman who had escaped. He pointed at her. "And get a statement from that woman. She was the victim."

"Which one?"

"The brunette. The blonde's mine."

The uniform gave him an admiring look, and Roberts stopped as he realized what he had said.

The blonde was his. And she wasn't the victim.

Yet.

Roberts cursed again, at nobody in particular, and trudged back toward her. Clouds were gathering, and as he walked, they covered the Sun.

McNeil was just getting into a book she'd been meaning to read for months. Burrowed deeply in an armchair, her gun within easy reach, she felt relaxed and comfortable.

"Lois!" Bob called from his office.

"Leave me 'lone," McNeil called back. "This book is just getting good."

"I finished an invention," Bob persisted. "I want you to see it."

She sighed deeply, but put the book down. Any invention of Bob's was bound to be more interesting. "To hear is to obey," she commented to the room in general, and headed back to his office.

"Check this out," Bob said. "It's a new combination of hardware and software I've just completed."

McNeil eyed the heavily wired apparatus. "What's it do?"

"It's the latest development in Virtual Reality," Bob announced proudly. "You know how the present systems let you choose options from pull-down menus?"

"Sure. When we do police training, we choose the gun we use from a pull-down."

"Good example," he said enthusiastically. "And pull-down menus are fine for that kind of thing. But what about when you're in the middle of something? Remember Virtual Meadow that you told me about?"

"Absolutely. It's still my favorite."

"Remember when Tessier asked if you wanted to do some fishing? And when you said yes, a tackle box appeared?"

"Yes," McNeil prompted.

"What if you could decide when you wanted to fish, and nobody would have to ask you? And what if, when the tackle box appeared, it looked like your grandfather's?"

"Well, that would be very nice," McNeil said.

Bob smiled proudly. "Now you can have it. I call it Subliminal Query."

"Sub—say that again?"

"Subliminal Query. Basically, it involves a much more sophisticated computer driver that can respond to your desires at the rate of forty-five per second. That's currently. I'm sure we'll upgrade that to more later on.

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And a new interface with your brain."

McNeil was interested. "How does it work?"

"Well, let's take an example. You told me about Virtual Spouse, where you could program in your own spouse so that you were spending time with him or her. Well, that took some pretty sophisticated programming or image scanning before your spouse would be in the program. But with Subliminal Query, the program does the imaging for you, kind of. For example, if you wanted to have some fantasy with some guy—"

"Like you?"

"Who else?" Bob grinned. "OK. So your fantasy has me appear in a doorway. Well, all the computer knows is that a form is supposed to appear in the doorway. What form? The driver will pelt you with questions. Human? And subconsciously, you answer yes—or at least, you exhibit some measurable response the computer take for a yes or no."

"Yes or *no?* What else would it be?"

"Well, not all fantasies will be sexual. Like, you could relive your childhood, and the form could be the dog you had as a child, for example."

"Oh, I see."

"Good. So if you respond 'no' to the human form, it keeps on asking until it hits on a positive response. So you've told it I'm human. Then it keeps on narrowing it down. Tall? Short? Caucasian? African-American? Blonde? Brunette? And so on. It also works with you to help your mind fill in some of the blanks without them actually appearing on the program."

"Seems slow."

"Well, it's hooked to the latest Artificial Intelligence system, which is still fairly basic, but helps cut some corners. For example, if you're measuring something, the AI unit knows it needs to come up with a number. That speeds things up, and the images take form pretty fast. So fast, in fact, that your brain won't notice the delays."

McNeil nodded slowly. "So what can you use this for?"

Bob smiled proudly. "Everything. It's the next generation of virtual reality programs. Everything is much more adaptable to you and your background. If you were to plug this into Virtual Family, for instance, you'd be able to experience it in your own house if you wanted to. Or the mansion you've always wanted. You wouldn't be tied down to the 'Leave It To Beaver' house that the current program provides, although it would still be available as an option."

"Wow."

"Yeah." His smile looked a little bit forced now. "So why don't you take if for a spin?"

"Why? What program is in there now?"

"There isn't one. It's just a free-association driver. It'll play whatever's on your mind."

McNeil sobered slightly. "Oh."

He cleared his throat. "Um—why don't you give it a shot?" he asked nervously.

She looked at him for a moment, then slowly took the goggles and put them on with growing trepidation. When they were attached, she nodded. "OK," she said simply.

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He was waiting for her outside the hospital.

Lois spotted him too late, and tried to turn back to the building, but he blocked her. "What's wrong, Lois?" he asked, his eyes glittering. "Aren't you glad to see me?"

"Bruce, you have a restraining order," she said, her legs going weak with fear. "You're supposed stay away from me!" All of her injuries throbbed with pain as she looked at him.

"Yeah, that restraining order," he said, grabbing her arm roughly. "I used it for toilet paper this morning."

Lois looked around desperately for help, but the parking lot was empty. "My dad is going to be here soon. You'd better let go."

"Well, then we'd better get going," he said, propelling her roughly toward his car. "He's not going to be able to find you."

She struggled wildly in fear, and broke off in a wild cry of pain as he wrenched her injured arm behind her back. She began to scream, but stopped in breathless terror as she felt the tip of his knife pressed against her throat.

"Don't make me cut you here in the parking lot," he hissed. "Wouldn't you like to live for a few more minutes?"

"Bruce, please, please don't. . . . "

He shoved her forward and wrenched open the driver's door of his car. "You recognize our car, don't you? You're gonna drive for us." He got in and dragged her after him, forcing her into the driver's seat as he slid to the passenger side. He pressed the blade of the knife against her neck. "Close the door."

She couldn't take her eyes off the knife, and groped blindly for the door handle. Carefully, trying not to move, she closed the door. A tear fell from her cheek and glittered briefly as it spattered on the blade.

"We're going for a drive," he told her dangerously. "Off to a place that's nice and deserted. Where they won't find you for weeks."

"No," she whispered.

He hit her backhanded, whipping her head around and knocking it against the window. "Shut up!" he screamed over her gasps of pain and terror. "Start driving!"

Numbly, she started the car and drove where he directed. She looked desperately in her rearview mirror for any sign of her dad, but didn't see his car anywhere.

He made her pull onto the highway, and they headed out of town. He had hidden his knife now, keeping it within six inches of her side, but down where it couldn't be seen by passing cars. He leaned back against his door, reclining in comfort. He looked at the terror on her face, and enjoyed the view. "You know what I'm gonna do to you?" he asked conversationally.

She shook her head, too terrified to speak.

He proceeded to tell her, in gory detail. As his monologue went on, she began sobbing in fear and panic and hopelessness. He was going to kill her, and she couldn't do a thing about it. He was too strong. He was armed. She was hurt and weak.

They were reaching the outskirts

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of town, and the four-lane highway degenerated into two lanes. They passed under a bridge, and she looked helplessly at the pedestrians crossing above them, happy and safe. Oh, to be one of them! If she could only get them to help her!

They approached another bridge, and she looked at the pedestrians crossing above them again. His droning monologue was gibberish to her now, and her blood roared in her ears. She acted instantly on her idea before she had time to think.

Just as they were going to go under the bridge, she jerked the steering wheel to the left with a gasp of effort and desperation. They both had only a split second to scream, and then the car crashed head-on into the concrete bridge abutment at fifty miles an hour.

There was a horrendous smash, and a shriek of tortured metal and a muffled bang as the driver's side airbag activated. She felt shoved into the opening pillow with tremendous pain as one of her legs broke, but the force made it impossible to scream.

And then there was deathly silence as the car stopped and she slumped back in her seat. "I'm alive, I'm alive, I can't believe I survived," she thought dazedly. She stared in shock at the junkyard of twisted and broken metal that lay right before her eyes, and then for the first time, she looked to her right.

Bruce lay on the floor of the car, crumpled and broken like a rag doll. The window and dashboard were smeared with his blood, and his limp and lifeless body, twisted at impossible angles, was covered with crimson. His knife lay abandoned amidst the littered wreckage of the glass and metal, powerless to hurt her. It gleamed evilly at her as it lay there.

She began to sob heavily, screaming with pain and sadness and fear, but most of all, crying in relief and the release of a year of tortured thought and tortured acts. He was dead.

He was dead.

He couldn't hurt her any more.

Tears streamed down her face, and Bob turned off the power and gently removed the goggles from her face. "He's dead!" she sobbed.

"Yes, he is," he said softly, putting his arms around her.

Her voice came jerkily, barely understandable through the sobs. "You knew I'd think of that, didn't you?"

"I had a good idea," he admitted.

She dissolved in tears again. "He can't hurt me any more!"

"Never again," he promised her. "And I think now you're finally going to realize it."

She didn't stop crying for a long time.

Jean lay nestled in the crook of his arm. He looked at her blonde head, shimmering in the glow of the candles, and sighed deeply in happiness. When he was with her, he almost forgot about Boegemann—not really forgot, he amended guiltily, but her presence was so powerful that everything else faded into the background. He smiled dreamily at the ceiling.

"Alex?" Jean said softly.

"Hmmm?" he answered, absently

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stroking her hair.

"Are your eyes all right?"

The strangeness of the question woke him up a little. "My eyes? What are you talking about?"

"This afternoon in the park. When you had your gun on the rapist."

"Yeah?"

"You used one hand to hold your gun. And sometimes you used your other hand to steady your gun."

"What's that got to do with my eyes?"

"Well, when you weren't steadying your gun with your other hand, you kept slapping your face."

Roberts rolled over and looked at her in amazement. "I did what? No, I didn't. Did I?"

"Sure," she said. She stroked his left temple softly. "Right about there. You kept knocking your hand against your head right there. Like you were trying to jolt your eyes into working, or like you wanted to knock something off your face."

"Ahhh," Roberts said as the light dawned. "I sure don't remember doing it, but it sounds like I was trying to knock the Virtual Training goggles off my face."

"But it wasn't training."

Roberts contemplated deeply. "I know," he said soberly. "But with virtual reality, it's hard to tell what's real life and what's not."

Jean looked very impressed. "Wow. Heavy point."

"Yeah. And the whole incident was very similar to one on the Virtual Training. One where it was a shooting situation, and I didn't shoot soon enough, and McNeil absolutely reamed me for it."

"Who's McNeil?"

"My boss," Roberts said briefly. *I hope you never meet her.*

But he didn't say it out loud.

The next morning, McNeil greeted him with a smile. That in itself was an unusual occurrence, and Roberts was surprised at how pleased he was that she would smile at him.

Something else was strange about the morning, but he didn't figure it out until she called him in to do their daily monitoring of Boegemann.

Roberts slumped down in his accustomed chair, really interested in preventing the routine from ruining his day, as it had ruined so many. A quick glance at McNeil's desk told him that something was missing.

He looked closer as McNeil puttered with the electronics and dug out the goggles. She was handing him his pair when he figured out what it was.

"Where's your gun?" he asked as he took the goggles.

"My gun?" McNeil parrotted. "Why do you ask?"

"Because you always keep it on the top of your desk, within easy reach, and it's not there today. You didn't lose it, did you?"

"No," McNeil said briefly. "I've got it in a drawer. Come on, let's get this over with."

Roberts wanted to ask why the change, but shrugged and took the goggles. McNeil put hers on, and instructed the computer to show any new fantasies.

The knife was sharp and cool, and

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he slid it slowly into its sheath. The sheath felt good against his bare skin, caressing his back, oh it felt nice. He watched as she walked into her apartment building, wearing those ridiculous tennis shoes, and waited nine and a half minutes before he got out and followed her.

It felt wonderfully exciting, walking across the street and into her building's lobby. He had dreamed of this for ages, oh such a long time, and now it was going to come true, yes, finally it was going to happen.

Tomorrow. Tomorrow.

McNeil stopped the computer, and they looked at each other grimly. Roberts wanted to crap in his pants.

"When did he record this one?" he croaked.

McNeil rattled some keys. "Last night. So he's planning it for tonight."

"Tonight."

"Tonight." Jesus.

"OK," said Roberts in a burst of energy. "I'll call her and tell her I'm going to pick her up at work. Then I'll take her to my place until it's all over. Then—"

"No," McNeil interrupted.

"Yes!" Roberts shouted.

"Get hold of yourself," McNeil said sternly. "I have a plan."

Roberts was suddenly paying close attention.

"You'll find out when she gets off work. You'll arrange to stop by. There's nothing strange in that; you've done it countless times."

"Then what?"

"You'll stop off at the flower shop, pick up some roses. Chat with the person who serves you, rave about your girlfriend."

"With you so far," Roberts said cautiously.

"Make sure you're memorable. The clerk's testimony may be valuable at the Just Cause hearing."

"Got it. I rave."

"You go to her building. Park a ways away."

"OK," Roberts prodded.

"You wait in your car. You don't go in."

"Bullshit! She's in danger! I'm going to be with her!"

"No, you're not. Simmer down and listen."

Roberts subsided with difficulty.

"You wait until you see Boegemann. Then you follow him in, giving him enough time so that he doesn't chicken out because he sees you."

"Forget it," Roberts snapped. "I'm waiting for him at the top of the stairs. He looks up and is staring down the barrel of my gun. He knows I know, but won't dare say anything to anybody. He runs off, and picks someone else."

"Brilliant," McNeil said sarcastically. "He gets away clean, and knows that someone has figured him out. He disappears, and kills someone somewhere else, some other time, and we will never know if he did it. Or how many people he's killed before he gets caught by conventional means."

Roberts wasn't listening. "He can kill a thousand other people for all I care! Just so she's not hurt."

"She won't be hurt," McNeil said irritably. "But there's no reason why he should get away. Just wait until he's breaking in; maybe until he's at-

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tacking her. Then you come in, and he's put away for a long time. And then he's got a record, and maybe some therapy."

Roberts stared at her silently. "You're ready to sacrifice his target to get him. Because that's all she is to you: an anonymous target. But she happens to be the woman I love, and I'm going to make sure she stays safe! And any other plan of yours can go straight to hell!"

"So what's your plan?" McNeil snapped.

"I go up the fire escape and get into her apartment. I'm waiting for him in there. When he tries to get in, I open the door and shoot him. Then, real quick, I pull out his knife and wrap his hand around it. Clearly self-defense."

McNeil looked piercingly at him. "I don't like how you're turning out."

"I don't care. I could not possibly care less."

"You're not going to be able to spend much time with her when you're in jail," McNeil remarked.

"Why would I be in jail?"

"Do you have a key to her apartment?"

"No," Roberts mumbled.

"Is the window from the fire escape unlocked, or will you have to force it?"

"I don't know," Roberts mumbled again.

"So there will be some major evidence that refutes your official story."

Roberts said nothing.

"What will you tell her just before you draw your gun and answer the door?" McNeil persisted. "Or for that matter, when you're in her apartment before she gets there?"

"I'll think of something."

"How confident are you of her ability to lie convincingly to the police on the scene, and also at the official hearing, when she's in shock?"

"I dunno."

"How sure are you that she'll even want to see you again after seeing you kill a man in cold blood?"

"I'll explain it to her. She'll believe me," Roberts said unconvincingly.

"So far, you've got no plan at all," McNeil said severely. She yanked open her file drawer and pulled out a thick sheaf of paper. "And, right here in my hand, I've got computer printouts that say you're reluctant to shoot people even when they're shooting directly at you!" She waved the paper in front of his face. "I have no confidence in your ability to shoot even Boegemann in cold blood. Knowing you, you'll screw around, wanting him to draw his knife so that you'll have reasonable cause, and you'll like as not be killed right along with her!"

"That won't happen."

"Or even if you manage to kill him, you'll leave some evidence that a sharp Internal Investigations agent will catch, and your career will be destroyed, and you'll end up in jail. And let me remind you, jail is not a pleasant place for cops to be. Every single inmate will be out to get you."

"Shut up!" Roberts yelled. "I've heard enough! I'm only interested in protecting her! Anything else that happens, I'll deal with it when it comes up."

"Listen to me," McNeil said.

"Face facts," Roberts interrupted.

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"I'm the only one who can carry out a rescue plan that has a chance of holding up in a hearing. You need my cooperation. That means I call the shots on this one."

McNeil looked thunderous. "You're too young, too inexperienced, and too emotionally involved to be saying anything intelligent."

"And you're too interested in catching the criminal, and too uninterested in saving the victim, for me to listen to you!" Roberts shot back. "I'm not blaming you—we're trained that way. Usually, by the time we show up, the victim's already dead, and if we catch the murderer, we tell ourselves that it's even. But it's not even. Somebody's dead, and it doesn't matter if we catch the asshole who did it or not—they're still dead! And if I have to go through my life without Jean, it doesn't matter what happens to Boegemann. And I don't care if I'm getting on your bad side forever. You can kick me out of the force. I'll be a security guard. I'll wash dishes. I'll go to jail. I don't care."

"Listen," McNeil said. "I just want you to listen to me."

"I'm listening. Make it good."

"I'll leave it to your discretion," McNeil said. "You just get there, and be in position, and have a few people who can corroborate your claim that you were just going over to surprise your girlfriend. You OK with that?"

"Yeah, I can do all of that."

"Then I'll leave the rescue time up to you. You can stop him on the stairs. You can stop him on the landing. You can also, and this is what I'd prefer, you can stop him as he's trying to get in the door. Then you're stopping him with strong cause, and it's reasonable to frisk him. Then he's in jail for quite a while. And who knows—if we're lucky, he'll resist, and then you can shoot him. As long as you're ready for him."

Roberts looked at her suspiciously, then nodded. "OK. I can live with that."

"You don't need to kill him?"

"Well, some of your questions are finally sinking in," Roberts admitted. "And like you said, maybe he'll try to jump me, and I'll have real cause. He's fantasized about killing me too, so who knows?"

McNeil regarded him closely. "Get started now, and set up your alibis. Then leave for her place straight from here. Spend some time today gearing up mentally. You'll need to be real sharp tonight."

Roberts nodded, the dread and the strain soaking into his bones. "It's gonna be a long day," he said finally.

"Beat it," McNeil said. "I've got some things I've got to do."

He slunk out, and she waited until the door closed. Then she turned on her computer again.

Roberts sat at his desk and tried not to vomit. Never in his life had a day gone so slowly. Never in his life had he felt so much fear and apprehension. He had been operating on adrenaline overload all day. Whenever he tried to distract himself the memory came rushing back, accompanied by another rush of adrenaline and a pounding heart. He tried to do some paperwork, but couldn't con-

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centrate. He considered checking on some of his uniformed subordinates, but didn't trust himself to act normally around them.

He dawdled at his desk, trying to pass the time. He was an island of silence in the noisy hubbub of the other officers around him. He tried to look busy, but wasn't sure how successful he was being.

He pulled out his Glock 10 and looked at it surreptitiously. It lay cold and heavy in his hand, faintly reassurring. He checked the magazine to make sure it was full, even though he knew it was.

McNeil's door opened, and he looked up, startled. She was walking out, looking grim. She glanced at him, and then left the building. Great. Just great. He could have used some encouragement, a little pep talk, but instead, she just left. So she had other cases to work on—big deal, didn't everyone?

"Roberts!" a voice called, scaring him to death.

He whirled around and stared at Thorson. "What? *What?*"

"Geez," Thorson said. "What's with you? I just wanted to know if you wanted to go grab some lunch."

"Sure," Roberts said automatically. "Great."

Roberts had no idea what he had for lunch, and no idea what he and Thorson talked about. He was stewing in liquid dread, completely unable to concentrate on anything. After lunch, he and Thorson walked back into the precinct, Thorson seeming a little annoyed. *Can't say as I blame him*, thought Roberts. *I can't have been very good company.*

He looked up and met McNeil's eyes.

She summoned him into her office with a jerk of her head, and he went wearily, unhappily. She closed the door and he slumped into his chair.

She looked at him appraisingly. "You look like shit," she informed him.

"Gee, what a coincidence," he said nastily. "I *feel* like shit."

She looked at him for a moment. "I don't think you're up to this."

"I'll handle it."

She looked doubtful. "How about something like this: you're feeling really ill. At the last minute, you can't make it, but can't get hold of her by phone. So you ask your lieutenant and buddy—that's me, by the way—to stop by her house and give your apologies. I go over and encounter Boegemann by sheerest coincidence."

"Forget it," Roberts snapped.

"It's a good story," McNeil said. "It's a plausible reason for me to be at the scene."

"There's only one problem," Roberts said angrily. "I don't trust you."

McNeil leaned forward, glowering darkly. "I'm *real* interested in an explanation of that remark."

Roberts wasn't cowed in the slightest. "The only person who's going over there is a person whose first and only concern is Jean's safety. And I don't think you have that." He looked her in the eye. "Sorry, Lieutenant, but I'm the only one doing this. And there's not a damned thing you can

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do about it."

McNeil's eyes glowed with anger, but she swallowed most of it. "Then for her sake, pull yourself together! Stop slinking around here like a whipped puppy, and start acting like an intelligent police officer! Start keeping up appearances! If you're going to do the plan, then do the whole plan, starting now when you act normal and excited to see your girlfriend. I saw Thorson's expression when you came back from lunch—what do you think he'll say at an inquiry?"

Roberts looked at her angrily, but straightened up in his chair. "All right. OK. I'm fine."

"Stay that way." McNeil ordered. "Now look. It's time you called her to arrange tonight."

Roberts nodded, but McNeil shook her head.

"Write this down," she ordered. "I don't trust you to remember all this."

Resentfully, he grabbed a pen and paper.

"Leave from here," she continued. "And talk a lot about the hot evening you've got planned. Then hit the flower store that's around the corner. It would be nice if several cops saw you leave it with a bunch of flowers."

Roberts nodded, scribbling.

"Then leave from here," McNeil went on. "Take West Seventh to Snelling, up to Grand. Figure on being ten or fifteen minutes early—no more than that, because we don't want you to be spotted sitting around in the neighborhood. And don't pull up or park right in front of the building. Boegemann might recognize you. Park nearby where you can spot him without him spotting you."

"Got it."

"And stay calm. Stay smart. That's your strong point, and if you panic, you're giving up your best weapon."

"OK."

"Now go call her. And start raving about her to Thorson."

Roberts left.

Jean was delighted to talk to him, but only had a minute. She happily agreed to meet after work, and told him that her bus usually dropped her off around 6:00. Remembering McNeil, Roberts wrote it down.

He pulled out a map and checked his route, even though he knew it in his sleep. Then he psyched himself up, and went to talk to Thorson. He laid on the lies thick and fast, apologizing for the lousy lunch, and telling him that it was because he was so preoccupied with his new girlfriend. Thorson was really a pretty good guy, and agreeably asked questions, and congratulated him when he was genuinely able to rave about Jean. He told Thorson about a few of their dates, and Thorson even had the sensitivity to not make many lewd remarks.

And then, suddenly, it was time to go.

He poked his head in on Thorson again, and bade him a cheery goodbye. He poked his head in McNeil's office and said goodbye in a much different tone. McNeil's face looked like it had been carved in granite. "Keep your head," she said. "Do good."

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Do good.

He strode around the corner, and asked the woman in the flower shop for suggestions on what to buy for a really special lady. They chatted as she pulled out a dozen long-stemmed roses, and he told her about Jean, and how long they'd been going out, and what she did.

"So are you going to get married?" she asked.

Roberts almost choked on his panic. "I hope so," he said truthfully.

He took the roses and made sure he walked past the precinct station again on the way to his car. Through a superhuman effort, he managed to keep from looking at his watch until he got in. Then, after imagining it so many times, he drove off. He'd often wondered how it would feel when it was finally happening, but the only thing he could think of was that he really needed to go to the bathroom.

He headed out on West Seventh Street, and cursed vilely at every stoplight. He finally got to Snelling, and took the steep, winding road up to where it leveled out to a long, straight stretch containing about seven thousand stoplights. He started wading through them, annoyed by the traffic, and then he stopped.

Or rather, the car stopped. All of the cars stopped. Stuck in the middle of a block, Roberts had no choice but to sit and wait.

He waited, with rising impatience and panic, shifting around and craning his neck to see what the delay was. Finally, he got out of the car and stood to look.

Road construction.

"Oh, Jesus," he said aloud.

Two lanes of Snelling were being ripped up right before his eyes, leaving only two lanes to handle the huge volume of traffic. Flagmen were on duty, allowing alternating directions to proceed. The backup was immense.

I do not have time for this, he thought as panic boiled up inside him. He checked his watch and saw that his personal time cushion was almost used up. McNeil's time cushion of ten or fifteen minutes remained, but that was not enough for him, considering what was at stake.

He got back in his car and opened the glove compartment. He took out his portable light apparatus, and seriously considered using it. But what good would it do? Where would all of these cars go if they wanted to get out of his way?

He was screwed.

The cars in front of his edged forward a little, and he wrenched his car into a gas station. Threading his way through the pumps and the other cars, he got to the side of the station, separated from a side road by only a curb and sidewalk. With a quick glance to each side he determined that there was nobody looking, and took his car over the curb and onto the street. He roared down it, and then turned up a street that paralleled Snelling. He began to relax a little, feeling good that he was underway again. The good feeling lasted exactly one block, when the road ended in a massive street barrier and a twenty-foot hole where the street should have been.

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Expletives spewed from his mouth as he swiftly looked over at Snelling. The cars were still at a standstill. He manhandled the car the other way, and found himself forced to drive all the way to Lexington Avenue before there was a clear path northward. He pulled onto it, narrowly escaping death from a semitrailer truck, and drove as quickly as he could.

Every stoplight on the road turned yellow as he approached, and the drivers in front of him always stopped. He seriously considered hurtling into the oncoming lane and running the light, but was restrained only by the image of the Internal Investigations officer grilling him. *If you didn't know the attack was planned, why were you in such a hurry to get there, Sergeant Roberts?*

I don't care if I rot in jail, as long as she's safe, he argued in answer, and made an illegal left turn onto a side street. Jogging over a couple of blocks, he then turned northward again. This street had no stoplights, just stop signs which he routinely ran through. "Hurry up, hurry up," he kept screaming to himself. He looked at his watch again, and knew that Boegemann was already there.

Jean bustled around her apartment, humming happily. Alex was going to show up any minute, and she wanted everything to be ready. She caught herself humming, and laughed. She hadn't realized how hard she had been looking for a man, and hadn't quite realized how happy she'd been since she'd found one—such a good one!

He would probably be showing up with flowers. She checked in her closet, and gazed at the array of vases she'd picked up in the last few weeks. She smiled happily in anticipation, and went into the bedroom to fluff the pillows.

She'd only been working for ten or fifteen minutes when there was a knock on the door. All right! He was here! She hurried across the living room and didn't even bother checking through the peephole before throwing open the door. "Hi, there!" she cried happily, then stopped.

The man standing in front of her wasn't Alex.

"Oh!" she said, startled.

"Hello," the man said.

"Jesus! Finally!" Roberts swore as he slammed his car into park, and burst out the door. There was no sign of Boegemann on the street, and Roberts barely had the presence of mind to grab the flowers as he plunged toward Jean's building, well behind schedule.

There was no sign of Boegemann in the lobby, and Roberts took the stairs two at a time. There was no sign of Boegemann on the stairs, and Roberts sprinted to the landing by Jean's door.

He heard the sounds of a struggle before he even reached the door. A panic-stricken try at the door showed that it was locked.

Roberts stared at the locked door in a thrall of horror. His gun was in his hand, lined up on the lock before his brain clicked in again. No, wait—think a second.

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He had watched Boegemann's rehearsals of this event dozens of times, and he knew that Boegemann would take his time. That meant that Roberts had time. That meant that he didn't have to give away his tactical advantage by shooting out the lock.

If there was another way into the apartment.

Roberts skittered for a second in panicky indecisiveness, and then managed to tear himself away from the door. He was down the hall in a flash, and was climbing the fire escape like a gymnast on speed. He sobbed with tension and fatigue as he sprinted full tilt up the narrow steps, ignoring the pain as he slipped, stumbled, scrabbled, and kept on going as fast as any human could.

He leaped over the top of the roof at full tilt, overbalanced himself, and fell full on his face onto the gravel roof. Fucking shit, you stupid fucking bastard, he kept his legs moving, grinding his face further into the gravel until he shoved himself upright, and he sprinted and stumbled across the roof, oh Jesus, oh please be on time, oh Christ, and he staggered up to the skylight and looked down on a titanic struggle.

Full framed in the skylight glass, Jean Searles fought with the killer. Most of the furniture in the room was destroyed, and she was bleeding from the mouth and nose. But the killer was limping badly, and he was fighting without the delight and glee evidenced in his fantasies. But he was stronger than she was, and was holding her from behind. His knife glittered as he raised it high.

Roberts's first shot was a shock round, shattering the glass of the skylight before it deflected wide. Jean and the killer recoiled in surprise, and Tessier half turned and looked up to face the source of the noise. Roberts's face was the face of death as he Double Tapped; the second round caught Tessier full on the breastbone and the third caught him in the shoulder and side as he fell back.

Tessier was pounded down in a heap, but he tried to get up, feebly brandishing the knife. A red pinpoint of laser light glittered briefly on his forehead, and then a gout of blood sprayed the hardwood floor as Roberts's last round caught him in the head.

Jean had been screaming for a long time; probably ever since the killer opened the door. Roberts was finally aware of it as he stuck his head and shoulders through the shattered skylight, holding his gun ready if Tessier so much as twitched. Jean recognized him for the first time.

"Alex!" she screamed. "Oh, Alex! Oh, Jesus, Alex!"

Roberts barely heard her as he examined the body. Yes, Tessier was dead. Roberts had never seen anybody quite so thoroughly dead before. Then a shock went through his body and his eyes gaped.

"Tessier!" he yelled. "Jesus Christ! It was Tessier! Not Boegemann!"

"What are you talking about?!" Jean yelled. "What's going on? Who the hell is this man?!"

Roberts rested his head against the cool glass and breathed deeply. *Oh, Jesus. No wonder we couldn't get*

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anything on Boegemann—he really was clean. Tessier! Christ, he led us on! I can't believe—

"Alex!" Jean screamed right at him, startling him back to reality. He looked at her strained face, marked by blood and tears, and his heart wrenched with pain.

"Jean, sweetheart, it's OK. Everything's gonna be fine. Unlock your door so I can come in, and then call 911. Tell them there's been a shooting, and that there's an officer on the scene."

McNeil was the third car at the apartment. She ignored the shocked, pale faces of the neighbors as they peered through cracks in their doorways, and swept through the police barricade tape. Her eyes darted over the living room, dark and grim, stabbing fiercely at strangers until they lit on Roberts comforting Searles on the sofa. Roberts was scraped and bloody, but McNeil determined that it was all superficial. Roberts looked up at her, and their eyes locked. Grimly, he nodded twice, and returned his attention to the sobbing woman. McNeil took a long, slow, shaking breath and allowed her shoulders to relax.

"Lieutenant McNeil," McNeil snapped at the uniformed cop who stepped forward to question her. She showed him her badge without looking at him, and stepped past.

She noted the signs of struggle, unaware that Roberts was watching her keenly. She saw the glass shards, and looked up to see the hole in the skylight without a change in expression. She moved forward and saw the body.

"Jesus Christ!" she hissed. "Stuart Tessier! It's Stuart *Tessier*!" She staggered backward a step in shock, and grabbed the back of the sofa.

"You know him Lieutenant?" the uniform asked her. "You can make a positive identification?"

"He—I—that—I mean, I—I went to school with him," McNeil said weakly. "Years ago. But that's him."

The uniform scribbled busily in his notepad, and McNeil looked over to see Roberts staring at her. She stepped over towards him.

"Are you both OK?" she asked in a low tone.

"No," Roberts said. "But we will be eventually."

McNeil lowered her voice even more. "It's Tessier! Not Boegemann!"

"I know," Roberts pointed out. "I shot him."

"So what was the deal?" McNeil pressed. "Some kind of sick call for help?"

"How the hell am I supposed to know?"

Jean Searles looked at them, still shaking visibly. "What are you two talking about?"

"I'll tell you about it later," Roberts promised. "Are you feeling up to giving a statement?"

She nodded jerkily, and Roberts called a uniform over. "Take this woman's statement," he ordered. "I'll be right back."

The cop pulled out a notebook and sat down by Jean. Roberts got up, staggered to the bathroom, and vomited in the sink.

Roberts took her to his apartment,

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and watched as she took the sedative supplied by the paramedics. Then he sat by the bed and watched her as she slept.

It's over.

He couldn't believe it. It seemed like years since he first met Stuart Tessier; since he had gotten caught up in this web of constant suspense and deception.

It's over.

He watched her as she sighed and rolled over. In the dim light, he could plainly see the garish scars and bruises the killer had left on her face, and the sight twisted his heart. He could see the bandages over her split knuckles where she had hit him, and knew that by fighting back she had bought the time necessary to save her life.

It's over.

Up until this moment, her safety had been the single most important thing in his life. And now that she was safe, and would have to learn the truth, he wondered if her life would have any place for him.

He hoped it wasn't over.

Jean rolled over again, and propped one eye open. "Alex," she said in a slurred voice.

"I'm right here," he said hastily.

"You knew about it."

"Knew about what?"

"The attack. That jerk, whatshisname, the killer. You knew it was going to happen." It wasn't a question.

"How did you know?"

"Things don't add up otherwise. Lots of little things on our dates."

He didn't have an answer. He was glad the district attorney hadn't been along on their dates.

She opened both eyes to gauge his reaction, and took his silence for an admission. She closed them again. "So how long have you been lying to me?"

Dread filled his soul from top to bottom. "From the beginning. Lots of little things."

She snorted. "Little things? A plot on my life is a little thing?"

"Little things," he persisted.

"In a nutshell," she requested.

"OK. I was on your bus to protect you and try to spot the killer. I wasn't planning to be so late to rescue you, but our plan was botched. I wasn't planning to fall in love with you, but I did anyway."

"Wow," she said, sighing deeply and turning away from him. "You can give me the details when I wake up."

"OK," he said, feeling helpless.

There was a pause, and then she rolled back over and looked at him with her deep green eyes. "Thank you, darling."

Relief flooded over him like a physical wave. He found himself smiling widely, and wanting to cry. "You're welcome, sweetheart," he said tenderly.

She smiled sleepily, and closed her eyes.

Roberts sat idly at his desk, looking over his shooting report. He had few concerns about being cleared of any wrongdoing: Jean's testimony, their established relationship, and the ample evidence of a struggle provided plenty of probable cause. According to the report, he had come

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to see her as he often did; he had heard the screams and the struggle; the door had been locked, so he went to the roof.

McNeil entered the room and Roberts looked up at her with a searching glance.

"What's up?" McNeil asked. She seemed a lot more relaxed than she had for a long time.

"Finished my report," Roberts said idly.

"So? Submit it. Let's get this over with."

"I've just been thinking," Roberts answered distantly.

"Always a dangerous sign."

"I was thinking about you," Roberts continued unmoved. "And I remember when you had the bug planted. And you told me that you had contacts everywhere—even in the Department of Transportation. It's just occured to me that you could have known that Snelling was going to be ripped up, and therefore impassible in rush hour. You could have known about the other street projects around the area. Maybe that's why you suggested my route."

McNeil's expression was turning thunderous. "What's your point?"

Roberts leaned forward and looked piercingly at her. "It's occurred to me that you could have set this whole thing up. Since you have a computer profile of my ability to think under stress, you could have known how long it would take me to get there despite the obstacles. You could have planned it to the second, to delay me enough so that Tessier would have had time to get in and attack her. So that when I did get there, the attack would be so far underway that I'd have no alternative but to shoot."

McNeil laughed harshly. "You must think I'm awfully powerful, to be able to get five DOT work crews to tear up whatever streets I tell them to, with one day's notice."

"I'm not saying that. I'm saying that you may have been looking for possible delays, found out about those, and didn't have to invent any more. Which you would have, if you hadn't lucked out with the road construction."

"Why would I do something like that?" McNeil grated.

"You wanted him dead."

"You did too."

"But I wouldn't cooperate with your rescue plan, so maybe you just developed one of your own. One I'd have no choice in. After all, the delays made sure I had to shoot him, and that I had just cause. The delays also made sure I didn't shoot him as he came up the stairs, which would have gotten me in a lot of trouble. So he's dead, and I'm not in jail or off the force. Which makes me wonder if you rigged it."

McNeil scowled deep and dark. "That," she said slowly, "is the goddamndest insult I've ever heard. I would never put you at risk like that. I'd never endanger her like that. I admit I'm glad he's dead, but I was only glad after I saw that you and Jean were alive!"

Roberts held up his hands. "OK, OK, I believe you," he said with dubious sincerity. "It just occured to me, that's all."

McNeil didn't relax. "You owe me

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an apology," she snarled.

"I apologize," Roberts muttered.

McNeil considered carefully, then spoke. "I accept your apology," she said.

Roberts flashed her a look. "It sure worked out nice, though, didn't it?"

"Yeah, it did," McNeil said, then looked at him. "*Better* than planned!"

Roberts started to smile. "Anything you say, Lieutenant."

McNeil strode quickly out of the room, trying not to hear Roberts chuckling behind her. ■

(Biolog continued from page 225)

think technology is the answer to all problems. He still thinks there is more to staying alive than manipulation of molecules.

Doug's stories generally have a near-future setting, based on hard science mildly extrapolated. He puts ordinary people in extraordinary situations to see how they're affected by technology and how they handle their problems. His high school creative writing teacher gave him a good start, and Stan Schmidt has added post-graduate courses in finished story telling. "Only the Weatherman" had to satisfy Dr. Schmidt through ten rewrites before appearing in the September 1990 issue. "Ryerson's Fate," April 1989, was the first *Analog* acceptance. A previous story had been rejected as not being speculative enough, but Doug was encouraged to try again by a personal note asking for more stories.

"Only the Weatherman," came in sixth in the annual "AnLab." The idea came after six months of thinking about a new technology, then crystallized in a few minutes, though it took another year for writing and acceptance.

"The Alicia Conspiracy," March, 1993, had its technology inspired by an article in a futurist magazine. It took a year to develop the human story to carry the scientific background. For authenticity in the third-world setting, he interviewed someone who had been in the Peace Corps in Lesotho and relatives who had spent time in the Phillipines. Doug is thinking about a sequel, which may come together any year now.

"Virtual Proof" came about after kicking a story idea around with a friend for four hours. A year of writing and working out details followed. Friends were consulted for suggestions, and a policeman filled Doug in on a cop's world.

Doug's mill grinds slowly. The fine result is the creation of new worlds and the breathing of life into people. ■

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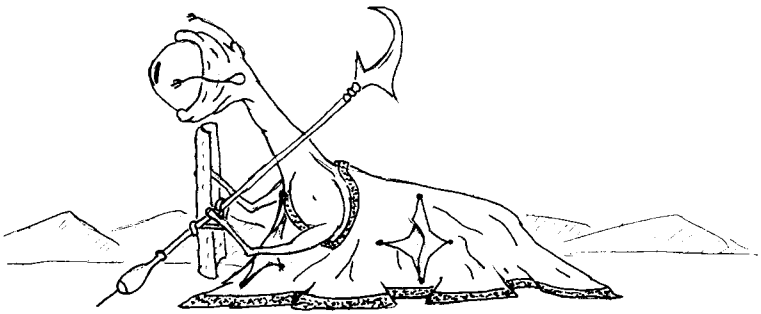
From the TRAVEL DIARY AND SKETCHBOOK OF BRAXTON MONTAGUE SHEW III

[Throop & Sons, Marsport, Krasnya Rep. (2394 A.D.)]



Groundsliding Bellywalker

Mater:

A fascinating stop on Mollosk IV, where we saw the groundsliding bellywalker, a sapient at about Earth +XX equivalent. The local humans call them "peepers." They move by rippling their abdominal muscles over a trail of secreted slime. Recently, a network of concrete-enclosed conduits, coated with a newly-synthesized organic slime substitute called Vazleeng, has been opened for public use. Known as the Interstate Slimeway System, it has proven very popular, although some peepers have complained about the sharp odor of the Vazleeng.

The peepers also communicate through their slime trails. The "slimer" secretes pheromones into the substrate, which the "slimee" reads by running over it and sensing the molecules. They call these "secrete messages." The waiting lines for best-sellers can be quite long. The most popular, personal memoirs, entice many to take a roll down memory lane.

The peepers are great fans of their antiquity. M'bwurto, Umberto, and I went to observe a "dturnyi," where, dressed in the panoply of a bygone day, gnaihts engage in simulated combat. ["Sir Brrrr't" posed for the enclosed sketch.] However, their "serial vision," wherein their brains process sequential images from their constantly waving eyestalk, is a poor substitute for our "binocular vision." Due to their poor depth perception, the combats consist mostly of wide misses, which, for humans, somewhat lessens the drama.

Your faithful son,
Brax

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THE REFERENCE LIBRARY Tom Easton

Inferno, Mike Resnick, TOR, $20.95, 320pp. (ISBN: 0-312-85437-4).
Virtual Light, William Gibson, Bantam, $21.95, 280 pp. (ISBN: 0-553-07499-7).
Camelot 30K, Robert L. Forward, TOR, $20.95, 319 pp. (ISBN: 0-312-85215-0).
Harm's Way, Colin Greenland, Avon, $4.99, 310 pp. (ISBN: 0-380-76883-6).
Testing, Charles Oberndorf, Bantam, $3.99, 136 pp. (ISBN: 0-553-56181-2).
More than Fire, Philip Jose Farmer, TOR, $20.95, 300 pp. (ISBN: 0-312-85280-0).
Alien Bootlegger and Other Stories, Rebecca Ore, TOR, $19.95, 313 pp. (ISBN: 0-312-85549-4).
Night Eyes, Bruce Boston, Chris Drumm Books (P. O. Box 445, Polk City, Iowa, 50226), $4.50 ($8 signed), 64 pp. (ISBN: 0-936055-55-3).
The Encyclopedia of Science Fiction, 2nd ed., John Clute and Peter Nicholls, eds., St. Martin's Press, $75, 1370 + xxxvi pp. (ISBN: 0-312-09618-6).
Books on Disk

Mike Resnick has long been fascinated, enchanted, and appalled by Africa. He has read everything he could get his hands on about the place. He has gone on frequent safaris (photographic, of course) there and written them up for the SF fan press (e.g., the fanzine *Lan's Lantern*). And he has based on its history a large portion of his fiction—notably the trilogy that began with *Paradise*.

For the last few decades, Western civilization has been struggling to live down its colonialist heritage. Now, "colonialist" does not mean quite the same thing as "colonial." A colonial moves into the neighborhood; a colonialist rips it off and rapes the neighbors as well. We don't have to live down the fact that our ancestors moved to the Americas, but we do have to live down what they did to those who were here before them.

Colonialism earned its first nasty reputation in connection with Africa.

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Slavery was part of it, but not all of it. There was also extreme greed for gold and jewels and other resources, as well as a remarkable shortsightedness about how much abuse the environment could withstand. Some of the damage was done by colonials. Some was done by natives acting on the colonials' example. Some was done as the natives threw off the foreign devils' yoke. Some was done when the situation allowed the maddest of natives to come to power.

Some parts of Africa have survived in fairly decent shape. Kenya is one such nation; it was the land that Resnick turned into the world of Peponi for *Paradise*. Some have virtually destroyed their economic infrastructures and become lands of poverty and starvation; meet Zimbabwe, become Karimon and *Purgatory*. Some have turned to madmen who in the name of tribal supremacy slaughtered their countryfolk by the millions (Serbs, Croats, and Bosnians have no monopoly on "ethnic cleansing"); in our world one prototype is Uganda, ruled in turn by the murderous Idi Amin and Milton Obote. Resnick has turned them into Faligor, Gama Labu, and William Barioke for the last book of his three "Chronicles of Distant Worlds," **Inferno.**

Faligor's natives, the jasons (they have golden fleeces), are primitive by human standards, but they are content enough until Susan Beddoes arrives. She is an emissary of Arthur Cartright, Assistant Secretary of the Republic's Department of Cartography, who wishes to raise the jasons to civilization without destroying them as has been done before (vide Karimon). She negotiates a place for the first arrivals, and the jasons soon learn agriculture, mining, commerce, and politics. They press for independence, gain it, elect their own leaders, and the slaughter begins while Resnick and the reader look on appalled. At the end, only the most tenuous of hopes remains.

I oversimplify, of course, but there's the gist of it: human contact equals catastrophe, echoing the sense of guilt many whites have accepted for past catastrophes in Africa and the Americas. If you wish to hear Resnick say the same thing, then listen: "Nowhere is it written in the Book of Fate that Arthur Cartright had to impose his values on a peaceful, happy people who never knew or cared that he existed until the day he decided to shape their society to his vision of utopia.

"I wish I were a religious man, because I feel the need to ask forgiveness of someone, and I cannot face the jasons to ask for theirs."

Perhaps that is the point. On one level, the books of this trilogy may seem repetitious. Indeed, *Paradise* by itself scored Resnick's rational debating points quite well, at least in part by doing justice to the complexity of the situation. *Purgatory* and now *Inferno* pay less attention to complexity; they focus on very particular aspects of the African catastrophe, which may make them seem a little shrill, and they beat Resnick's points to death. Yet on another, more emotional level, the three do add up to something greater than the sum of

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the parts, and that something seems to me great enough to make the trilogy live long after less thoughtful and less anguished works have vanished from memory.

William Gibson has made a tremendous splash with his work, both in and out of the science fiction world—*Newsweek* even listed him among the "cultural elite" everyone should keep an eye on. His novels *Neuromancer* and *Mona Lisa Overdrive*, among other stories, did a great deal to install cyberspace and virtual reality on the shelf of standard SF equipment for others to draw upon just as they have long drawn upon hyperspace warp drives.

His latest novel, **Virtual Light,** has the familiar gritty, street-life feel of cyberpunk fiction, but it does not strike me as up to the standard Gibson has taught us to expect of him. The novelty he offers us—glasses that impose a computer-generated heads-up display ("virtual light") on the outer world—is only a minor extension of what he has played with before, and the story is a fairly ordinary extended car-chase.

The book's greatest charm is surely what Gibson has done with San Francisco's Golden Gate bridge. After an earthquake ruined the approach to the bridge, street people took it over, using gobs of super-glue to encrust the towers, decks, cables, and sides with squats and shanties and shops. It's a nifty place, and it's where Chevette Washington lives when she is not working as a bicycle messenger.

One day, Chevette's job takes her to a building where circumstances land her in the middle of a party, face to face with an obnoxious loudmouth who is just begging to have his pocket picked. She obliges, unaware that the loudmouth is a courier for a Medellin-backed illicit data haven and what she swipes contains some *very* sensitive information.

Meanwhile, Berry Rydell has just blown his job as a private cop and been told to go to San Francisco to help retrieve that information. Appalled by what he learns about the links between the data source, the real cops, and the private cops, he kicks over the applecart and absconds with both Chevette and her booty.

Gibson's "virtual light" gizmo is just a maguffin here, an excuse for the action. The action itself lacks suspense and is quite predictable. The bridge is nifty—but it isn't enough to make this one worthy of Gibson's reputation. Pass it up.

If there is an heir to Hal Clement's mantle as dean of hard SF, it has to be Robert L. Forward, whose latest, **Camelot 30K,** is hard SF in the classic mold. That is, the characters leave immense amounts to be desired and the plot is rudimentary, but the world Forward has developed presents a puzzle that is the story's sole reason for existence and is sure to delight Clement fans.

Here's the setup: Even as Earth retreats from space, a robot probe photographs a Kuiper Belt (close-in Oort Cloud) ice-ball and reveals tiny cities full of tiny aliens. Scientists lobby for

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and get an expedition, done on the cheap with momentum-exchange slingshots, and here we are, face to face with the kerack Merlene, Wizard of the city of Camalor. A Wizard is an alchemist, inventor, discoverer, and natural intermediary with the more advanced humans. Through her, the explorers, wearing tiny robotic kerack bodies, learn a great deal about the local culture (rather medieval; hence the book's title), technology (much of it based on a biology capable of purifying isotopes), sociobiology (reminiscent of the social insects), and chemistry (at 30K, there are only parallels to the familiar).

The characters pose a very basic question early on: The keracks are too far from the Sun for photosynthesis to keep them alive as it does us. So what energy source supports their food chain? The immediate answer—free radicals generated by cosmic rays—proves incomplete. The complete answer depends intimately on kerack biology, promises catastrophe if Earth continues to think the keracks are the solution to the nuclear waste disposal problem, and is enough to give even a long-time SF reader with a decent sense of modern tech a sense-of-wonder thrill as it ends the story with a bang.

Saying much more would give too much away, but if you wish Clement were still writing, I've said quite enough. You won't want to miss this one.

The last book to do a number on Daniel Defoe's *Moll Flanders* was Stephen Fine's *Molly Dear: The Autobiography of an Android* (reviewed in the June 1989 column). You might think once was enough, but I wouldn't mention it unless someone had thought that wasn't true.

So here's Colin Greenland's **Harm's Way.** It's not an SF "translation" like Fine's book, but more of a sequel, supposing that the England of Defoe's time sailed the seas of space in ships of wood and sail, took pills to replace air in space, had Earls and Dukes ad mad infinitum on every world and moon and rock in space, reached out to the stars, and even had aliens in the stews of London.

The tale's narrator is Sophronia Farthing, an urchin whose prize possession is a gold ring with a mysterious sigil. The man she calls Papa is a laudanum addict full of stories. They live on High Haven, where the ships come to dock, and one day she meets a man who seems to think he knew her late mother. That is enough to drive her to stow away on a ship and embark on a perilous tour of the Solar System in quite the Moll Flanders tradition. And in due time she learns that her mother's real name was Molly, how she lived and what dire fate befell her, as well as who her true father was and what awful intentions he has for her. The end, of course, is a happy one.

This one's a charmer. It even deserves the label of tour de force. Yet it does have one grand flaw that will surely spoil it for many: Its view of space and space technology feels quite as if Defoe might have dreamed it in 1700, but it is arrant nonsense to any modern reader who believes

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reality is what it is no matter what the conventions of culture insist. That is, if the English of the 17th and 18th centuries had gone to space, they would very quickly have been forced to learn a great many "modern" truths about space, aether, gravity, planets, and the like. To pretend otherwise may be cute and charming, but it is the merest of pretence. Where Fine's book was SF, this one is fantasy.

Charles Oberndorf's **Testing** is a novella with an intriguing premise. Some time hence, after the U.S. economy has suffered a Great Fall so severe that it makes the Great Depression look like nothing worse than a bad afternoon at the track, the country is struggling back toward respectability and prosperity. Because many people have come to blame shortsighted, unethical behavior for past problems, ethics is now a major component of the educational curriculum, to the point where high school seniors must pass a virtual reality ethics exam if they wish to go on to college.

Meet Karl. He's one of those seniors. The exam is just a few days ahead of him. He lives with his mother and uncle (it takes two to raise a family, and marriage is somewhat out of fashion). He has a girlfriend with whom he does deliciously naughty things (he's the one on the pill). He has buddies who put severely unethical temptation in his path. And he worries.

And that's about it. We have here a portrait of a world that just might be able to grow from our own; Oberndorf is an impressive extrapolator. But though Karl has the opportunity to be decisive and break the pattern that threatens to bind him forevermore, he chooses instead to avoid risky behavior, to play it safe.

Of course, his choice is very true to life. Most people don't care to take chances, at least not serious chances. Those who do are responsible for the world's excitement, for heroism, villainy, and creativity. And a society that would insist on morality testing must be exceedingly risk-averse, so there is a cogent comment on our present-day situation.

It's a shame the nature of the comment could not provide a more satisfying story.

Philip Jose Farmer's **More than Fire** is a disappointment. Pitched as "the long-awaited conclusion to the 'World of Tiers' saga," it begins as Kickaha and Anana the Bright finally discover a gate that will remove them from the planet of the Tripeds, on which they were trapped by Red Orc. Both Anana and Red Orc are immortal Lords, of that group who long ago created the universes as personal playgrounds. Anana is Kickaha's lusciously sweet true love (is that why one initial is a B? If so, says my wife, her black hair must mean she's overripe). Red Orc is an arch-fiend who delights in torment and destruction; of course, it's all due to his childhood traumas, but Kickaha still keeps getting kicked in the head.

After a bit of backfill to remind you where the series was when it left off

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in 1977 (*The Lavalite World*), Our Heroes discover that they have exchanged one trap for another. Thanks to possessing the Horn of Shambarimen, they bust free, but now they are facing a strange creature in suspended animation, the last of the Thokina, that species rumored to have come before the Lords and even to have created them. You say you've never heard of them before? Never mind, that's just the way Farmer works; his hat is bottomless.

Once more they escape, and now here is Red Orc once more, peril upon peril, miraculous hair's-breadth escape upon escape. But not for B. Anana. Alas, she is B-spoiled, her memory wiped away to restore her childhood and permit Red Orc to work his evil wiles upon her. But Kickaha is clever and resourceful and above all lucky. The tables turn and turn and turn, and in the end. . . .

Well. It *is* billed as the conclusion to the saga. It's no surprise to find that Kickaha emerges quite triumphant at the end.

What disappointed me was that it felt like such a hasty, perfunctory job. I had the impression that Farmer was too bored or weary to summon up the verve and originality that gave the earlier volumes in the series their appeal.

It has been too long since Rebecca Ore's last novel, *The Illegal Rebirth of Billy the Kid*, which I reviewed in March 1991. Fortunately, she now brings us a collection, **Alien Bootlegger and Other Stories.**

The title story is set in the Virginia billy-hills, where the alien Turkemaw of Svarti has bought a place and begun to produce moonshine with a very strange kick to it. The locals looking on include Berenice, an aging one-time hippy radical lady, Marie, a black chemical engineering student, Dennis DeSpain, the man who has a finger in every local human-run still, and others. There are jealousy, conniving, intrigue, and death, and the alien as foil to illuminate very human foibles. Ore's portrayals ring very true, and without making the alien terribly comprehensible in our terms at all.

Setting the alien in familiar territory seems to appeal to Ore. "Farming in Virginia" does it again, though this time the bootleg creation is not booze. To do the same thing in another way, she has posited the bioengineering of domestic (and other) animals into special-purpose chimeras, some of them humanoid. "The Tyrant that I Serve" shows us one of those purposes—the infliction of terror on the chimera's owner—and the trauma this necessarily imposes on the chimera; the true tyrant is perhaps the search for excitement. "Giant Flesh Holograms Keep My Baby's Eyes Warm" considers the tyranny of scripted lives.

"Ice-gouged Lakes, Glacier-bound Times" supposes intelligent aliens so adapted to ice-age climates that they cannot survive when warm times come. They therefore play the part of game animals in exchange for periodic transplantation to worlds in the throes of ice. Then they come to a future frozen Earth, and a young biol-

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ogist discovers their intelligence. "Projectile Weapons" offers a young alien so obsessed by movies that when he reaches Earth he turns outlaw; detectives of his own and human kind must struggle to understand the differences of kinds and catch the kid before he kills.

The terminal essay, "Aliens and the Artificial Other," is less satisfying because Ore's rather jerky approach to story-telling is better suited to fiction than to nonfiction. Nonetheless, it does illuminate what she is trying to do with that fiction.

Bruce Boston's **Night Eyes** is his latest collection of deft, quirky short stories. Some are SF; "Headed for Prime Time" offers a vision of future docudrama based on "timeshooting"—recording past events—that in the end is a wistful take on the "If only things had gone a little better" school of human discontent. Some are fantasy; "The Animist" presents a man whom objects are out to get. Some can only be called warped mainstream; "The Eyes of the Crowd" deals with a traveling salesman, not terribly successful, whom the train system delivers to a town with no exit. Some are half poetry; the first portion of "The Curse of the Alien's Wife" did in fact appear as a poem (see *Accursed Wives*, which I reviewed last October); it works better in this form.

Would you like this one? As I said, Boston is deft and quirky. He is also gifted with a distinctive way of seeing the "other"; "wistful" may be the best word for it. As well, his voice differs from those of most modern SF writers, for he has a tendency to tell his stories rather than, in the modern way, let his characters perform them for the reader. If his style thus reminds the reader of older material, that is not a defect; it is the best of the classics he brings to mind, not the worst.

The first edition of **The Encyclopedia of Science Fiction** appeared in 1979 and served as a standard reference in the field for years. Now the second edition is available, updated, revised, and expanded with so much new material that it's about twice as big as the first edition. It's no trick at all to predict that this too will be a standard reference until it necessarily becomes out of date in its turn. (Thanks to computers, we can expect a third edition to arrive more promptly.)

How does one review an encyclopedia? On its accuracy? I checked here and there and found no major problems; it did come with eleven pages of corrections and last-minute updates. On the nature of its coverage? Author entries include biographical and bibliographical details, usually accompanied by some attempt to appraise; the appraisals will sometimes smart but they do seem fair. There are also entries for magazines, films, genres (including poetry and Feghoots), nations, and themes, with plenty of cross-references. There are no entries for books as such, presumably on the grounds that if you know the author you can find the title. Nor are there entries for the great many

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creations (e.g., Pern) and prominent series that some of the book's users may wish to look up. The theme entries will be of some use to people with questions of the "What was the name of that book about mutant potatoes?" sort, but the themes covered are larger rather than smaller (there's no entry for potatoes, but there is one for mutants), and the number of titles mentioned is—as it must be—limited.

In other words, this encyclopedia could be more than it is, but probably not in one volume. Its present form may be the ideal compromise between exhaustive (encyclopedic) completeness and marketable usefulness.

If you think the price looks like a stopper, look at the page count and compare it to three or four hardbound novels. It's not so bad at all.

BOOKS ON DISK

Mea culpa! I goofed when in last June's column I called Brad Templeton's "all the SF you can read for $4.95" service the "Library of the Future." It's really the "Library of Tomorrow," and I *knew* that. So did the annoyed folks at World Library who use the former name for their CD-ROM series of public domain classics.

Speaking of CD-ROM, Templeton's ClariNet Communications Corp. (Box 1479 Cupertino, CA 95015-1479) is offering *The "Electric Science Fiction" 1993 Hugo & Nebula Award Anthology.* By the time you read this, Templeton says, it will be available via network, modem, floppy disk, and CD-ROM. It contains the texts of all the novels nominated for a 1993 Hugo award; all the short fiction nominated for either Hugo or Nebula; 3 Nebula-nominated novels, including the winner; a special annotated edition of Vernor Vinge's *A Fire upon the Deep;* artwork, fan material, and lots more, including a joke book. The CD-ROM even has video clips of authors introducing stories. The floppy-disk version is the least comprehensive (no novels, and fewer graphics).

Cost varies, depending on the version you buy. The CD-ROM is $29.95 (plus $2.50 s&h), which is a very good price for copies of Maureen McHugh's *China Mountain Zhang,* Connie Willis's *Doomsday Book,* Vernor Vinge's *A Fire Upon the Deep,* Kim Stanley Robinson's *Red Mars,* and John Varley's *Steel Beach,* as well as so much more.

You can order by fax (408-296-1668), credit card (408-296-1668 or 800-USE-NETS), or modem (connect to sf.clarinet.com via telnet or by dialing 408-296-3733; log in as "sf", then select "o" for order at the menu prompt; you'll run an interactive order script). ■

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BRASS TACKS

Dear *Analog*:

In regards to the May Alternate View, by G. Harry Stine, there are many people who would love to have one of those old computers. I for one, since I don't even have a typewriter.

In Arkansas there is a program called ICAN that takes donations of medical and computer equipment, then distributes them to handicapped people whose lives can be changed with technology. I am a paraplegic.

The kicker for the donors is that the value of the equipment can be deducted from federal taxes as charitable contributions.

If you'll write I'll send the available literature; if you run into another available computer I need one *bad*, as I plan to start grad school this summer.

STAN PARKER

Rt. 2 Box 90
Harrisburg, AR

Dear Mr. Schmidt:

Thank you for publishing Dr. J. Kevin Steele's article, "Is AIDS an Autoimmune Disease?" (May 1993). One of the more bizarre things about AIDS that I have read elsewhere is that, in the late stages of the disease, there is often little virus left in the body—yet one would expect just the opposite if it is HIV itself that is directly causing AIDS. After reading Dr. Steele's excellent article, it all seemed to make sense to me by confirming what I had suspected for quite some time about AIDS, namely that there is something more than just the virus that is producing the devastating opportunistic infections that eventually kill.

I believe that the bulk of AIDS research must be turned in this direction if a cure or effective treatment is to be found. The autoimmune theory seems to be the best one we have right now, and a massive research effort by the medical establishment might vindicate those like J. Kevin Steele and Peter Duesberg—to the relief of millions of AIDS victims who could survive this pandemic as a result.

MICHAEL KOY

New Brunswick, NJ

Dear Dr. Schmidt

I would appreciate it if you pass the following to Dr. Arlan Andrews, the author of the *Analog* June 1993 fact article "Single Stage to Infinity!"

I found the article very interesting, and I wish the SSRT (Single Stage Rocket Technology) project every

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success. As interesting as the article was, it took me two sittings to finish it due to its Space Shuttle "bashing." I found the frequent barbs at such a useful (but flawed) program very annoying and somewhat misplaced.

The SSRT project will apparently be using a lot of technology developed for the shuttle program, such as electronics, throttlable engines, and materials. If SSRT works well, it won't be the first or last successful system that was built on the failure of an earlier pioneer. I'm sure that had the designers and builders of the original shuttle had the extra 20 years of technology and development the SSRT project has, the shuttle would also be a better machine.

I also worry about Dr. Andrews's predictions on the capabilities, cost, and turn-around of the "DC-1" system that is the object of the SSRT project. I just hope that these predictions don't come back to haunt the project the way over-optimistic hype ruined the Shuttle's reputation.

I would have also been more pleased with the article if it hadn't finished with a cute "future-oriented stockholder" scenario. The interest of such a fantastic creature is not worth its placement as some sort of "closing argument" for the article; the USA needs cheap and effective orbital access whether Wall Street is interested or not. A better closure to the article might have been some information on where to watch for current news on the DC-X prototype tests Dr. Andrews expects this summer. It's easier to impress a congressman when you write about current events than old news.

JERRY BURCHARD
Morgantown, WV

Dear Dr. Schmidt,

Regarding Arlan Andrews's article, "Single Stage to Infinity!" The article assumes that DC-Y can be built. The payload capacity of staged vehicles is roughly 2 percent of their Gross Lift-Off Weight (GLOW). The carrying capacity of a Single Stage To Orbit (SSTO) vehicle is typically estimated at 1 percent of its GLOW. Keeping these figures in mind, it's easy to see how a SSTO vehicle can fail. If the weight estimates or engine performance of the DC-Y are only slightly off its payload, capacity can disappear.

Currently, it's an even money bet whether DC-Y will work. The odds, though, can be pushed to favor low cost access to space. In the late sixties, the government funded experiments in low cost expendable launch vehicle. Rocket engines were built by plumbing contractors and fuel tanks were made by a boiler company. The concept was abandoned due to reliability issues and the promise of reusability by the space shuttle. The low cost expendable launch vehicle, deemed too unreliable for man or satellite launches, can serve as a pipeline into space carrying food, water, and air for manned operations; propellant for propulsion; and the raw materials needed for space-based industries.

The low cost expendable launch vehicle is also the key to DC-Y operations. The DC-Y carries propellant in

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place of wings. It uses its rocket engines to slow itself down for landing. The DC-Y engineers have assumed that their vehicle must carry its return fuel into orbit. If we assume that the DC-Y is refueled in orbit, then its weight margins are drastically increased, assuring that a SSTO vehicle can be built. This propellant though must come from a second type of vehicle, the low cost expendable launch vehicle. On-orbit refueling shifts the problem from advancing material science to developing on-orbit cryogenic refueling operations.

It may be that DC-Y will work as planned and there will be no need for the low cost expendable launch vehicle. But if it does fail, we should remember that there is another solution.

JAMES H. SLOAN
17701 S. Avalon Blvd #407
Carson, CA 90746

The author replies:

Mr. Sloan is quite right; there has been an ongoing debate about whether the so-called "mass fraction" of any SSTO can ever be sufficient to allow the craft to orbit itself alone, much less carry a payload and return fuel. I mentioned this concern obliquely in the article: "With the materials and rocket engines available in the 1960s, a single stage craft could only have flown the distance from New Mexico to Greenland."

However, the SSTO engineers plan to do advanced computer evaluation of the DC-Y structure, actual fabrication and weighing of DC-Y parts, and to perform continuous, incremental improvements in every aspect of the design. They are visionaries but they are hardheaded realists foremost. If they say it will fly, it will fly!

My primary interest in this rocket ship is not technological. My main thrust in the article was the first incorporation of the "skunk works"/"concurrent engineering" project philosophy into an open, "white," project, and how this mindset complements perfectly the bottom-line "airplane-like operations" envisioned for the Delta Clippers.

And, I'm sorry to respond negatively to the writer's conviction that there is another way. Having just left the new administration two weeks ago (3/31/93) I can tell you that, if the follow-on SSRT/SSTO project isn't funded this year, we probably will see American space flight diminish and eventually peter out to nothing. Symptom: the optimistic and open-ended Space Exploration Initiative outlined in the mid-December 1992 *Analog* by my friend and fellow White House Science Office analyst, Dr. Doug Beason, has been canceled. As of early 1993, there are no government plans for a future return to the Moon or for going on to Mars.

Politically, if the U. S. government is going to do the job, there is no more time for proposing this or that alternative, not Mr. Sloan's "Big Dumb Cheap Boosters," not giant rifle shots into space, not buying and using Russian boosters. I repeat: by the time this reply appears in late 1993, the trajectory of future U.S. space flight will be determined. Hopefully, the DC-X will have flown beautifully at White Sands, prompting

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funding for larger-scale craft and more testing, perhaps even opening the full-scale SSTO project for new proposals and new bids from eager competitors with other, better technologies and business plans.

Realistically, without government funding to help, the private sector in the U.S. is not going to risk their money to take us into Space—there's nothing we need to do there now, not yet any way to make a return on investment. Unfortunately, with the technology and finances of the 1990s, only government can begin the process. The grim alternative is a fairly rapid shutdown of American flights in space. Arthur C. Clarke's beautiful visions of space flight in *2001: A Space Odyssey*, will be decades, perhaps centuries, late—maybe never.

ARLAN ANDREWS

Dear Mr. Schmidt:

Perhaps one of the stories in the current (June 1993) *Analog* does not have a reference to nanotechnology. This surfeit has been creeping up on us month by month. I hope it has peaked. Are the little critters secreted in your editorial RAM, inserting references to themselves like so many narcissistic shoemaker's elves?

I am only suggesting that you consider whether appeals to nanotechnology have begun to assume the aura of other conventional shortcuts and panaceas, like neural networks in software engineering.

Thank you for years of good reading.

RUSKIN LANGLEY

Glendale, CA

I'm sorry you're bothered by the growing ubiquity of nanotechnology in science fiction, but I can't promise you that it's peaked or will go away. To too many writers who've looked closely at the detailed speculations, it looks so inevitable that it may have to be taken for granted in a wide range of possible futures. Fifty years from now, your letter may sound like one written in 1890 complaining that too many stories set in 1993 have everybody living in houses with electricity!

Dear Dr. Schmidt,

In the Brass Tacks section of the June 1993 issue of *Analog*, Charles Ardai comments that the word "millihelen," which was used by David Goines in an article in the October 1992 issue, goes back at least to 1975. He even quotes a source which attributes the word to an unknown coiner.

It may interest you to know that the inventor of the word was apparently none other than the late, great Isaac Asimov, the Good Doctor himself, whose name graces your sister magazine. On page 200 of his book *Asimov Laughs Again* (HarperCollins, 1992), the last book of his that he saw published before he died, he wrote:

> During the days when I was a graduate student in the early forties, we were dealing with chemistry in which there were a great many units used in measuring various quantities—in particular, the entire metric system. A friend of mine, Martin Castillo, and I therefore whiled away one lunch period by making up units and I finally

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came up with the "millihelen," which is enough beauty to launch one ship. (After all, Helen of Troy had a "face that launched a thousand ships.")

Years later, I saw "millihelen" in *Time*, and it wasn't attributed to me. . . .

MICHAEL A. BURSTEIN

New York, NY

Dear Mr. Schmidt,

First, I want to take this opportunity to congratulate all involved on a great magazine. The juxtaposition of science fiction *and* fact makes for much thought provoking reading. After all, science fiction (at least hard science fiction) must ultimately found itself in science fact.

This brings me to the point of this letter. As *Analog* realizes, by putting together fiction with fact, it is important that the various compartments of human knowledge interface. So, I was glad to read the editorial of June 1993, entitled "Crosstalk," which supports this idea.

When I was a history major in college in the mid-eighties, there was much talk about the need for more interdisciplinary education. The idea being, of course, that disciplines should talk to each other, and not remain isolated (a position put forward in your editorial). Thus, my interest in combining such "diverse" fields as history, geography, archeology, and ecology, was encouraged.

But then, as now, my question is: Why does this even need to be discussed? How have we come to a point where we are so compartmentalized that an idea such as crosstalk needs to be brought up? It seems that interdisciplinary communication should be a given—the default mode of academic thought. It makes no sense to Balkanize the fields of human thought into isolated, almost warring kingdoms.

In fact, pigeonholing transcends academia, and manifests itself in the everyday attitude of minimal knowledge. This has always been an intellectual pet-peeve of mine. Personally (though I admit that it might not be for everyone), I appreciate the idea behind "Renaissance" learning, where one specializes in a few things, but knows at least the fundamentals of many more. It is only by doing so that one will be able to find the connections that enable us to make the great leaps forward.

That is not to say that the small advances are unimportant, for they are vital. But neither should we close ourselves off from the fertile environment of crosstalk.

Anyway, I wanted to put in my two cents in support of what I consider to be a critically important movement. Regardless of whether I think we should be where we are or not, the situation remains. I hope that more people will stand up and tell it like it is. And as always, science fiction will probably be at the forefront of such intellectual endeavors.

One final thing—I was glad to see something new by John Brunner. I recently read *The Evil that Men Do*, from the late sixties, and like his style.

Thanks again for a fine magazine.

ANDREW J. CUNNINGHAM

Decatur, GA

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To *Analog*:

John Cramer will surely correct me if I'm wrong: Is not the pressure at three miles ocean depth *500* atmospheres rather than his *100* (page 83, May 1993)?

J.E. ENEVER

England

Yep. Sorry about that! ■

IN TIMES TO COME

Our next issue marks a bit of a departure from a common pattern. An *Analog* cover commonly illustrates a story in the issue—usually one of the *longer* stories. Our offering for February 1994 includes two very strong novellas, but the cover goes to "Romantic Ideals," a short but powerful story by Jeffery D. Kooistra. Idealism hasn't been much in favor lately, perhaps because reality often has trouble living up to it; but it does have its uses. In a life-threatening emergency, for instance, in which no "right" options are available. . . .

One of the aforementioned novellas is G. David Nordley's "Network," wherein you'll again meet a world and some widely diverse beings that you took quite a liking to in "Poles Apart" (which you elected our best novella or novelette of 1992). This time, though, they must face a completely new threat from outside. The other novella is related to no other story, but it is from an author whose too-rare appearances you consistently greet with enthusiasm: Stephen L. Burns. "Song from a Broken Instrument" is a *tour de force* you should read when you feel up to an emotional roller-coaster ride. The owner of the "broken instrument" has a seemingly insurmountable problem; ingenious technology offers just a hint of hope, but real solutions tend to take that and a lot more besides!

The fact article seems particularly pertinent as I write this, with another hurricane bearing down on the east coast, anxiously watched by people who remember too vividly the damage wrought by predecessors like Andrew. Can anything be done to prevent such catastrophes in the future? Well, maybe. Engineer Leon Billig has an idea. . . .

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INDEX

Here is the Index to *Analog*'s sixty-fourth year: 1993, Volume 113. Entries are arranged alphabetically by author, with month and page. (There were two issues in December, abbreviated Dec. and Mid-D.) When the author's name and/or part of the entry's title is omitted, it is the same as that of the previous entry. Collaborations are listed under all authors, with cross references. Unless otherwise noted, each entry is identified as a novel (nov), serial (ser), novella (na), novelette (nt), short story (ss), fact article (fa), Probability Zero (pz), editorial (ed), Alternate View (AV), special feature (sf), or poem (pm).

—The Analytical Laboratory (results) ..... Jul 136

Adams, Rick (& Michael A. Banks) (sf) What Do I Do If I Get a Phone Call From Mars? ..... Jul 270
Allen, Roger MacBride (nt) A Touch of Diphtheria ..... Feb 124
Anderson, Kevin J. (ss) Music Played on the Strings of Time ..... Jan 149
— (ss) Tide Pools ..... Dec 78
Andrews, Arlan (nt) Hail, Columbia! ..... Aug 12
Andrews, Dr. Arlan, Sr. (fa) Single Stage to Infinity! ..... Jun 50
Ash, Paul (nov) The Man Who Stayed Behind ..... Jul 14

Banks, Michael A. (& Rick Adams) (sf) What Do I Do If I Get a Phone Call From Mars? ..... Jul 270
Beason, Doug (ss) To Bring *Down* the Steel ..... Oct 74
Bennett, Gregory (nt) Swan Song ..... Aug 128
— (nt) Tinker's Spectacles ... Jun 86
Bohnhoff, Maya Kaathryn (nt) A Tear in the Mind's Eye .... May 134
— (ser) Squatter's Rights (Part I of II) ..... Mar 14
— (ser) Squatter's Rights (Conclusion) ..... Apr 114
Bova, Ben (ss) Conspiracy Theory ..... Apr 80
Brejcha, F. Alexander (ss) Can You Hear What I See? ..... Aug 76
Brunner, John (& Er*c Fr*nk R*ss*ll) (nt) The Numbers Racket ..... Jun 12
Burkhead, David L. (nt) EMT ... Dec 134
— (ss) Match Point ..... Feb 112
Burns, Stephen L. (nt) Leap .... Jan 12
— (nt) Showdown at Hell Creek ..... Mid-D 12
— (ss) White Room ..... May 114

Callin, Grant (nt) The Carhart Shale ..... Oct 12
Canough, Dr. Gay E. (fa) Working Up to Space Solar Power ..... Nov 72
Carr, Jayge (nt) Mourning Blue Feb 14
— (ss) When Johnny Comes Marching Home Again—and Again—and Again ..... Aug 48
Cartier, Francis (ss) The Day the Signal Stopped ..... Jan 132
Chilson, Rob (ss) The Worting's Testament ..... Mar 86
Cramer, John G. (AV) DUMAND: Neutrinos from Beneath the Ocean ..... Jun 80
— (AV) Neutrinos, Ripples, and Time Loops ..... Feb 107
— (AV) Science and SF in Japan ..... Apr 108
— (AV) Science Policy: The Parable of the King and the Harvest ..... Aug 92
— (AV) The Quantum Physics of Teleportation ..... Dec 111
— (AV) The Tachyon Drive: Infinite Exhaust Velocity at Zero Energy Cost ..... Oct 111

de Camp, L. Sprague (fa) Goat Island ..... Apr 62

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— (nt) Pliocene Romance .... Jan 78
— (nt) The Mislaid Mastodon May 54
Dick, Gordon (& Duncan Lunan) (fa) Flight in Non-Terrestrial Atmospheres..... Jan 56
Donaldson, Thomas (fa) The Holes of Space-Time..... Jul 122
Dyson, Marianne J. (pm) The Fashion of Physics ..... Apr 107

Easton, Tom The Reference Library..... Jan 303
——..... Feb 160
——..... Mar 162
——..... Apr 160
——..... May 131
——..... Jun 160
——..... Jul 248
——..... Aug 161
——..... Sep 160
——..... Oct 162
——..... Nov 162
——..... Dec 161
——..... Mid-D 160

Flynn, Michael F. (ss) From the Corner of the Eye..... Nov 86
— (ss) Great, Sweet Mother . Jun 70
Flynn, Michael F. (& Edward Rietman) (fa) FAT-Eating Logic Bombs and the Vampire Worm ..... Feb 40
Frankos, Laura (ss) Hoofer ..... Jul 252
Frazier, Robert (pm) Lesser Ironies of Science ..... Mar 125

Garland, Mark A. (pm) How Far They Are ..... Mid-D 174
Gillett, Ph.D., Stephen L. (fa) Beyond Prometheus..... Dec 66
— (fa) Carbonosis: Organic Desiccation and the Fermi Paradox ..... Mar 74

Halverson, Mark O. (na) Incident at the Angel of Boundless Compassion ..... Jun 120
Hatch, Daniel (nt) Beyond the Big Circus ..... Feb 82
— (ss) Generational Conflict . Sep 72
— (na) Senator Space Cadet . Nov 116
Howe, Robert J. (pz) De Gustibus ..... Oct 116

Jennings, Phillip C. (ss) Restart Dec 118

Klein, Jay Kay (Biolog) Jeffery D. Kooistra ..... Dec 89
— Paula Robinson..... Mid-D 110
— Stephen L. Burns..... Jan 53
Kooistra, Jeffery D. (ss) Puff... Mid-D 116
— (ss) Spcpt. Vu ..... Nov 96
— (nt) Sunshine, Genius, and Rust ..... May 14
— (ss) The Return of the Golden Age ..... Mar 126
— (na) Young Again..... Dec 12

Landis, Geoffrey A. (ss) The Boy Who Wanted to be a Hero Feb 102
Larsen, Doug (nt) The Alicia Conspiracy..... Mar 138
Lesney, Mark S. (fa) Old MacDonald Had a Pharm: Gene Farming and the Biopharmaceutical Revolution ..... Aug 60
Ligon, Tom (na) The Gardener. Nov 12
Liss, Jeffrey G. (pz) Prisoners' Dilemma ..... Aug 116
Lunan, Duncan (nt) With Time Comes Concord..... Sept 126
Lunan, Duncan (& Gordon Dick) (fa) Flight in Non-Terrestrial Atmospheres..... Jan 56

Martino, Joe (nt) Paper Virus .. Mid-D 126
Moscoe, Mike (ss) One Picture is Worth . . . . Mid-D 86

Nagata, Linda (nt) Small Victories ..... Sept 82
Nordley, G. David (pz) Attraction..... Jan 221
— (na) Into the Miranda Rift. Jul 138

Oltion, Jerry (nt) Course Changes..... Sep 14
— (ss) Dedication..... Oct 69
— (ss) Hit and Run..... Apr 46

Patterson, Kent (pz) Alien Automotive..... Jan 96
— (ss) Defend with the Utmost Endeavor..... Jul 190

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Robinson, Paula (ss) Pibloktoq Mid-D 102
Robinson, Spider (na) The End of the Painbow ..... Jul 272
— (na) The Immediate Family Jan 158
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— (na) Darwin's Children..... Oct 118
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— (nt) The Ghost in the Machine ..... Mar 100

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— (nt) The Invariants of Nature..... Apr 12
Sparhawk, Bud (ss) Dad ..... Jun 36
— (ss) Jake's Gift ..... Sep 110
— (ss) R-TRNRD ..... Mid-D 72
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Strumfels, David J. (ss) Deal with the Devil ..... Jun 112

Terra, Richard (fa) Working Molecules: Progress Toward Nanotechnology..... Oct 44
Thompson, W.R. (nt) On Tour with Gyez ..... Oct 90
— (ss) The Plot to Save Hitler Sep 40
Turtledove, Harry (na) Down in the Bottomlands ..... Jan 224

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UPCOMING EVENTS Anthony Lewis

14-16 January
RUSTYCON 11 (Seattle area SF conference). Artist Guest of Honor: Bob Eggleton; Fan Guests of Honor: John and Bjo Trimble. Registration: $30 until 31 December 1993, $35 thereafter. Info: Rustycon 11, Box 84291, Seattle WA 98124-5591.

21-23 January
CONFUSION XX (Michigan area SF conference) at Holiday Inn Crowne Plaza, Romulus, Mich. Guest of Honor: Joan D. Vinge; Fan Guest of Honor: Leah Zeldes Smith; Artist Guest of Honor: Erin McKee; TM—Andrew Offutt; Special Guests: Illuminatus. Registration: $22 until 31 December 1993, $25 thereafter and at the door. Info: ConFusion, Box 8284, Ann Arbor MI 48107.

21-23 January
ARISIA (Boston area SF conference) at Park Plaza Hotel and Towers, Boston, Mass. Guests of Honor: Spider and Jeanne Robinson; Artist Guest of Honor: Michael Whelan; Fan Guest of Honor: David Kyle. Registration: $30 in advance, $40 at the door. Info: Arisia 94, 1 Kendall Sq. #322, Cambridge MA 02139. (617) 273-0697, BBS (617) 364-1576.

18-20 February
BOSKONE XXXI (New England SF conference) at the Sheraton Tara, Framingham, Mass. Guests of Honor: Emma Bull & Will Shetterly; Official Artist: Nicholas Jainschigg; Special Guests: Patrick & Teresa Nielsen Hayden. Registration: $30 until 15 January, more at the door. Info: Post Office Box 809, Framingham MA 01701.

1-5 September
CONADIAN (52nd World Science Fiction Convention) at Convention Centre, Winnipeg, Manitoba. Guest of Honour: Anne McCaffrey; Artist Guest of Honour: George Barr; Fan Guest of Honour: Robert Runté; TM: Barry Longyear. Registration: $85 (C$95) adult, $30 (C$35) child until 30 September 1993; Supporting: $25 (C$30). This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: Conadian, Box 2430, Winnipeg MB R3C 4A7 Canada or Box 7111, Fargo ND 58109 (204) 942-9494; FAX (204) 942-3427.

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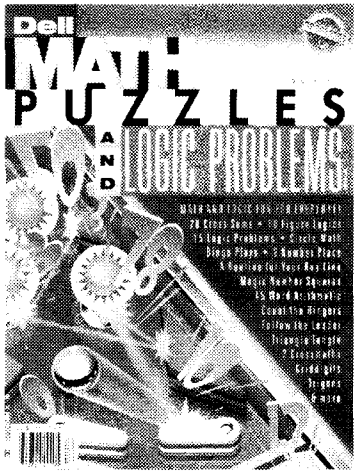

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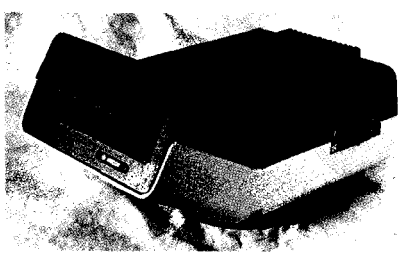

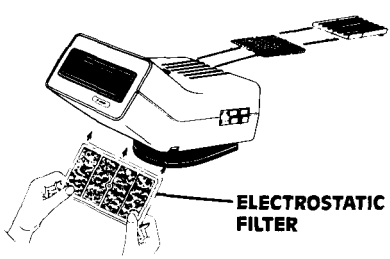

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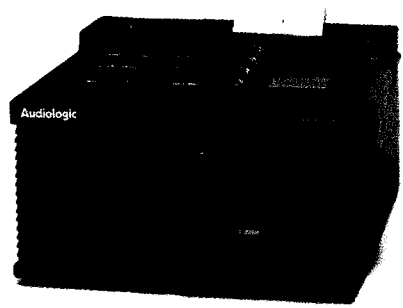

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